Heating and Ventilating

For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning

Volume 32 | MAY, 1935 | Number 5

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Published Monthly by

THE INDUSTRIAL PRESS, 148 LAFAYETTE STREET, NEW YORK

WESTERN OFFICE: 228 NORTH LA SALLE ST., CHICAGO

ROBERT B. LUCHARS, President
EDGAR A. BECKER, Vice-Pres. and Treasurer
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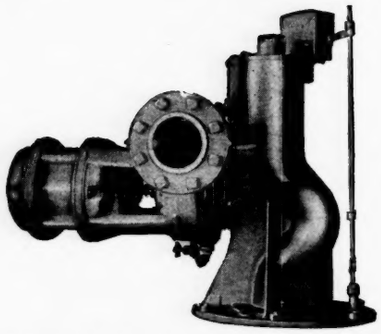
Subscription, $2 per year in United States and Mexico. $2.50 in Canada. $3 all other countries. Single copies regular issue, 30 cents; special issues, $1.



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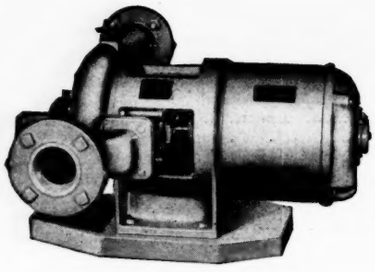

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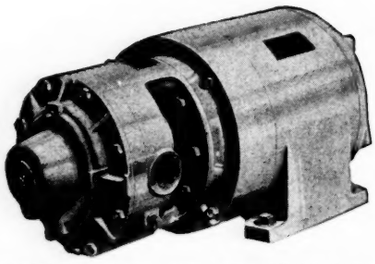

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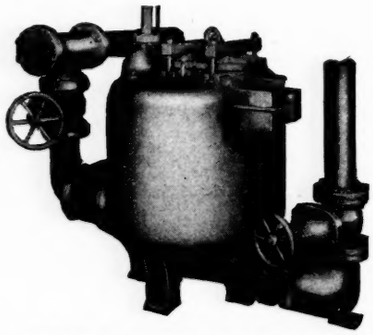

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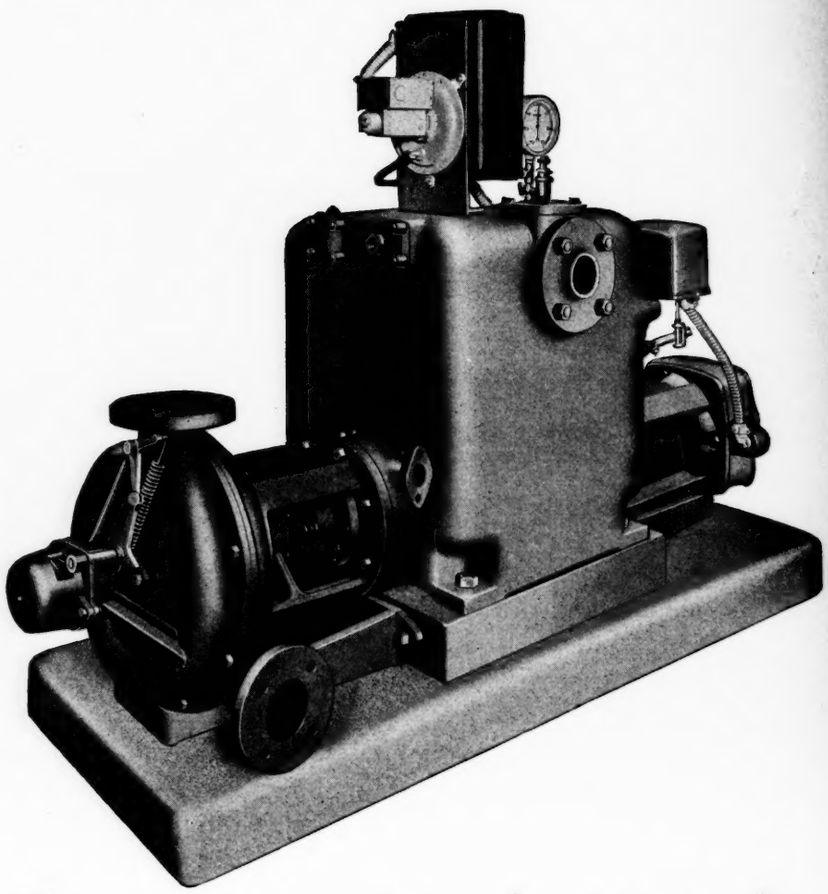

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A Completely Conditioned Prefabricated House

ALTHOUGH the idea of the prefabricated house is an old one, such buildings, as a popular subject for discussion and as a solution of the high cost of building problem, really date from the 1933 Century of Progress in Chicago where the various displays of all kinds of modern houses attracted far more attention than was anticipated. Application of mass production methods to house building has obvious advantages, but on the other hand there are many who hold that homes can not be successfully sold in packaged form.

Housing authorities have shown that the mass market for homes lies in that part of the population whose earnings are below $3000 per year, and that during the past building boom, great as it was, while the salaried and professional classes with earnings above that figure were taken care of, the lower paid groups could not afford to own their own home. There were reasons for this, one being that labor costs were too high on hand-built houses, and, since the builders were usually small buyers, even the material costs were higher than would be the case if large volume buyers were purchasing the materials.

A low-cost prefabricated house, which is at the same time semi-portable, has the advantage that its owner can take it along with him when he changes jobs and moves to another city, or even another part of the city or town, an important point to wage and low salaried workers who find themselves forced to change jobs rather frequently.

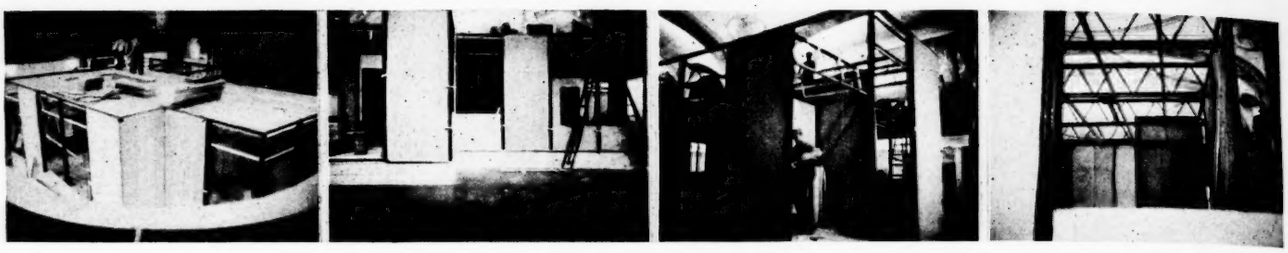
With these points in its favor, it seems strange that houses of this type have not already appeared in large numbers. Among the reasons for this may be the fact that it is only since the depression that large organizations with sufficient capital to make a success of such an enterprise became interested. In addition, there have been more than the usual number of difficulties to smooth out. Undoubtedly, too, there has been opposition to the prefabricated house from established builders, architects, contractors, and possibly some manufacturers.

At any rate, there is evidence that the prefabricated house is making headway, and that it may be a powerful factor in future housing. The construction industry and its branches are interested in watching the progress of the packaged house and considering what effect it will have on the existing residential building business.

For this reason, the activity of one company engaged in the design and distribution of a line of prefabricated houses is here described. This particular company's houses were selected for several reasons; a number of the houses are now under construction, the company plans to be in actual production by the time this publication goes to press, and the widespread interest displayed in the houses and the way they are heated and air conditioned.[1]

The houses are available in six standard designs with layouts that are reversible in plan. The frame of the house consists of (a) steel columns, into which fit

[1]Information on which this article is based was supplied through the courtesy of D. C. Slipher, in charge of heating and air conditioning for American Houses, Inc., New York, whose houses, called Motohomes, are herein described.



Views of the prefabricated house erected in Wanamaker's auditorium in New York for display purposes. This house as well as the one illustrated on the first page of this article is a small model. Larger ones, including two-story houses are available.

the sidewalls, which are of solid units of asbestos board inside and outside, bonded to an intermediate layer of mineral base insulation, and (b) 16-in. joists, also of steel, fabricated of top and bottom strips joined by diagonal bracing. The joints between the sidewall and the columns or studs are protected by waterproof cement and by a non-corrosive aluminum alloy plate which extends vertically along the joint on the exterior. The insulation in the exterior walls gives them a heat loss of 0.14 B.t.u. per hr. per degree difference in temperature, while the roof has a coefficient of 0.11. The walls require no paint but may be painted if desired.

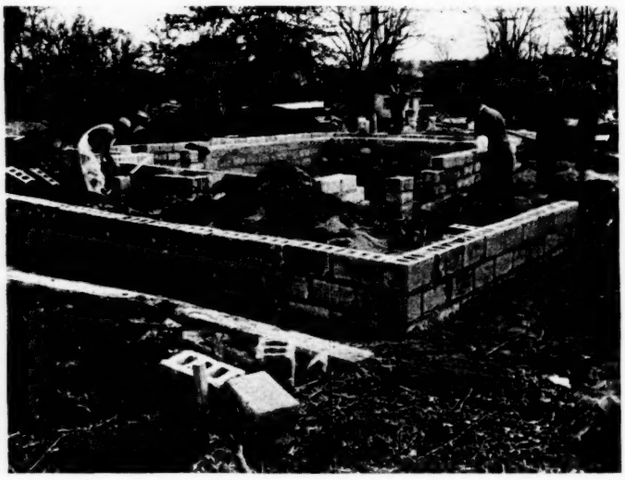
Floors are of a compressed hardwood which can be attractively waxed, and the ceilings are of acoustical material. On the interior walls a washable fabric covering is used instead of wallpaper and spots can be removed from this with soap and water. The casement windows have cranked handles similar to those in automobiles and can be equipped with storm windows. In the bedrooms, which are large enough to permit twin beds, the windows are arranged at the corners so as to allow a flexible arrangement of furniture, not possible if the windows were in the customary position.

The four smallest models of houses are one-story and the two largest are two-story. They vary in size from three rooms, kitchen, and bath to the largest which has nine rooms, kitchen, and three baths.

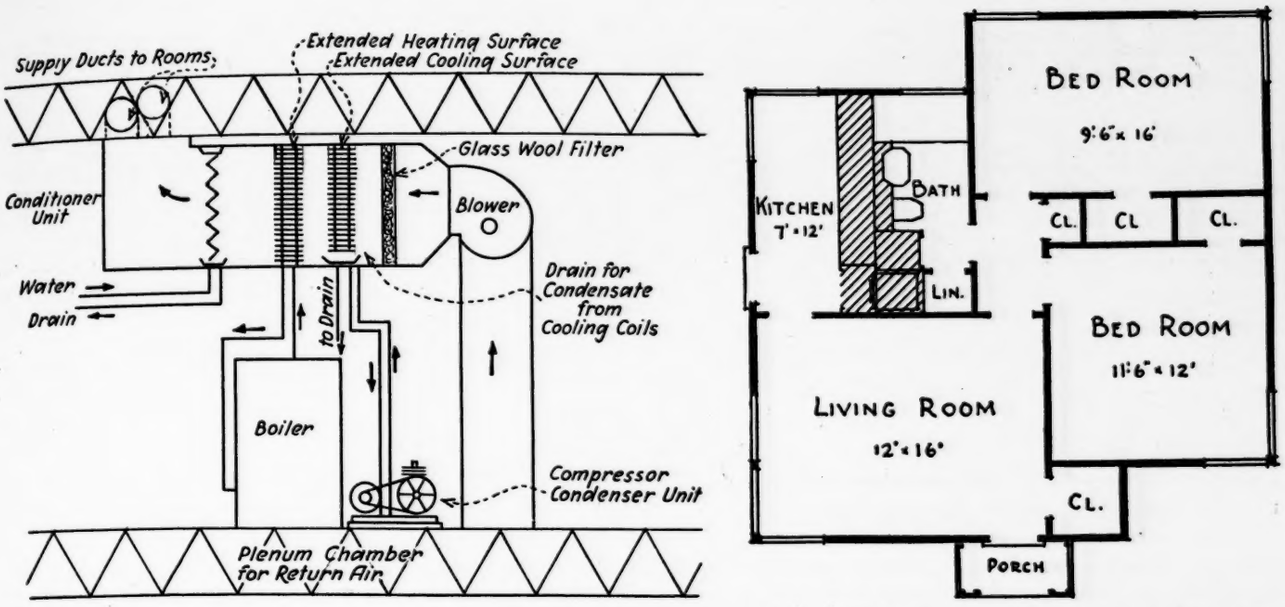
Prices of these houses range from $3800 to $9900. These can be secured for monthly payments from $38 to $99 a month, but in order to do this the owner must have as security a clear title of his lot. Monthly installments are expected to extend over a period of 15 years and include fire and life insurance so that if the owner dies his family will own the house with no further payments. It is expected that if the purchaser of one of the smaller houses should later require additional space an addition can be added easily. The whole house can be taken down and re-erected on another site.

The steel construction is designed to withstand heavy snow loads and hurricanes. No cellar is contemplated since the heating plant is placed on the ground floor, but a cellar may be had at additional cost. A concrete foundation which extends below the frost line is supplied. The houses may be had with either pitched or flat roofs.

Between the kitchen and the bathroom is space for what is known as the moto-unit, which contains practically all of the mechanical equipment for the house. These devices come complete in a large metal cabinet, one side becoming the kitchen and the other the bath. In two-story houses this unit extends up to the second floor. An electrical exhaust for the kitchen also connects with the bathroom. For warm climates it is arranged to connect with the roof air space. Built into the moto-unit is an electric refrigerator, sink, and electric dish washer. In the larger houses there is an electric clothes washer. The owner may have a gas or electric stove, whichever is more economical in his community. There is complete cupboard space which is provided with food, soap, and other staple household necessities that are required upon moving into the



(Left) Laying the foundation for one of the three prefabricated houses erected in White Plains, N. Y., for demonstration purposes. A basement is optional. (Right) The steel joists used in the construction of the prefabricated house described in this article. Through the diagonal bracing the air conditioning ducts are run.



(Left) A schematic diagram of the air conditioning for the prefabricated house. (Right) A plan of the smallest one of the prefabricated houses. The complete line includes houses which range in size from this one to large two-story houses with nine rooms, kitchen, and three baths.

house. Built-in lighting is arranged so that the housewife may work with efficiency and comfort.

The reverse side of the moto-unit forms the bathroom, which has modern lighting. Triple-adjustable mirrors form the medicine cabinet, directly under which is a wash basin large enough to wash a baby in without bending over. Beneath the lavatory is an auxiliary electric heater which blows warm air into the bathroom on chilly mornings. At one end of the bathroom is the bathtub and shower. The toilet is a new type which hangs from the wall so that the floor can be kept clean beneath, and is placed lower than the normal toilet as an aid in the relief of constipation.

Every house is air conditioned and this includes cooling in the summer. The method used is that of an indirect conditioner, with a steam boiler supplying the conditioner unit with the conditioned air being distributed by ducts in the various rooms.

The boiler can be fired by oil, gas, or coal and, since the house is highly insulated, the boiler and burners are very small units. As shown in the drawing, the recirculated air is drawn from beneath the floor, this space being used as a plenum chamber lined with sheet iron insulation. The boiler and compressor are mounted on the floor while the indirect conditioner unit is placed near the ceiling. A centrifugal blower forces the air through a glass wool filter over an extended cooling surface connected to a compressor-condenser unit. A drip pan beneath the cooling surface drains off the condensate from the cooling coils. The air then passes over the heating surface, finally through a humidifier, and then to circular ducts which run between the bracing in the joists above the ceiling.

A two-speed fan is used which is run at low speed during the heating season. During the summer the refrigerating capacity is sufficient to cool two rooms to 10° below the outside temperature and this is accomplished with the fan at low speed. However, it is also possible to cool the whole house to some extent and when this is done the fan is placed on high speed.

The air conditioning units are made in four sizes which have sufficient range to take care of any of the six houses. The heating capacities of these four units are 45,000, 55,000, 70,000, and 90,000 B.t.u. per hr. The cooling capacities are one ton for the three smaller units and 1¼ ton for the largest. The blower, which is of the sirocco type, in the smallest house has a capacity of 500 c.f.m. when on low speed and 750 c.f.m. on high speed. Low and high speeds of the three other units are: 750, 950; 950, 1150; 1150, 1300 c.f.m. The cooling capacity is said to be sufficient to cool the temperature of two rooms 10° below the outside temperature and maintain 50% relative humidity. When cooling the whole house a temperature differential of 4° can be maintained and the same relative humidity as when cooling two rooms—that is, 50%.

The houses are prefabricated and partially assembled and shipped by rail or boat to distribution depots. From these depots it is planned that they be shipped by truck to the site. The smaller houses can be erected in two weeks and the larger in three weeks. A building superintendent and mechanical superintendent will accompany each shipment. Local labor under the direction of these men is employed to erect the houses. One of the advantages of the fabricated house is that very little local labor need be used. The design of the heating and air conditioning unit precludes any great amount of installation work and in fact this should require only a few hours to connect up. In general, the same is true of the remainder of the building, so that with competent supervision only a minimum amount of labor will be necessary on the site.

Consequently, it can be seen that the contractor, whether he is engaged in heating, plumbing, or sheet metal work, will have very little, if anything, to do with these houses. The local labor employed to hook up the systems can be non-union mechanics as there are no other building trades involved.

Hospital Provides Facilities for Future Air Conditioning Units in New Building

BEGONIA pink lobbies, coral bedrooms, and shell pink nurseries were the features which received most of the comments and publicity when Chicago's new Henrotin Policlinic Hospital formally opened its doors on Friday evening, February 15. Not as noticeable, but just as noteworthy, was the heating and ventilating equipment of the Y-shaped, highly compact building which replaced the 28-year-old former quarters of the hospital.

Provision for Air Conditioning

One of the most interesting features is the provision made for future air conditioning of the hospital. As the authorities believed that no suitable unit for hospital use had been developed, plugged tees in the water and waste piping and electrical connections have been provided for possible future air conditioning units. It is believed that individual units are necessary for hospital use so that air conditions favorable to each patient can be maintained. The sentiment for air conditioning at the hospital is very favorable and it is believed that units will be added to the hospital gradually as required.

A low-pressure steam system with a vacuum return is used for heating the building. From 2 to 5-lb. pressure is carried on the radiator supply mains and 5-in. vacuum on the returns. About 30,000 sq. ft. of radiator surface, principally of the cast-iron convector type, are used. A large number of the radiators are recessed in the walls and except in a few special cases enough surface is provided to heat the rooms to 70°. The X-ray, delivery and labor rooms are thermostatically maintained at 80° while the operating rooms, nurseries, isolation, and premature rooms are kept at 90°.

Steam is furnished by two 100-hp. boilers operating at a pressure of 100 lb. per sq. in. The boilers not only supply steam to the new hospital but also to the old adjoining building and the nurses' home. It is expected that the old building will soon be demolished to make room for the widening of La Salle Street so that this load will be taken off the boilers.

Each of the boilers is fired with an 85 gal. per hr. oil burner equipped with the necessary safety devices. The fuel oil is stored in two 7,500-gal. tanks with submerged heating coils for warming the oil. Before going to the burners, the oil passes through a second heater where it is heated to 180°.

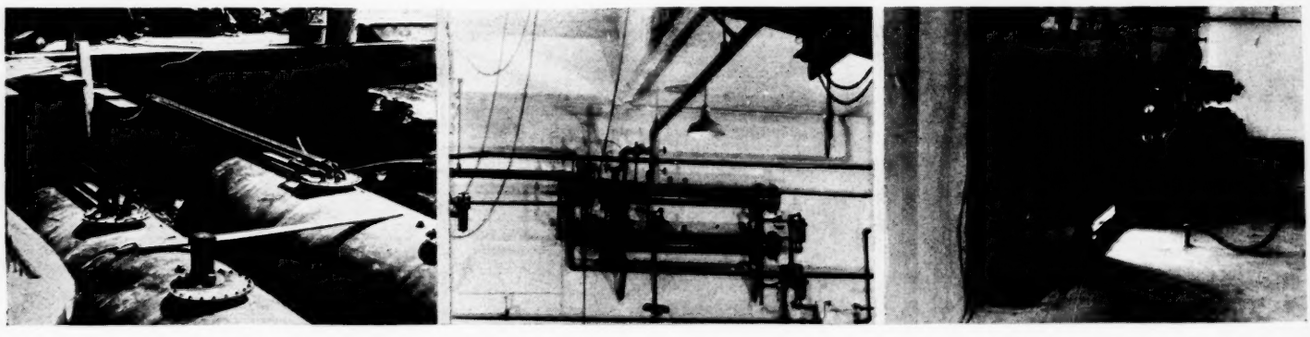
A considerable amount of high-pressure steam is used in the hospital. The laundry requires steam at 90 lb., the sterilizers at 60 lb., and the kitchen at 30 lb. The boiler feed and vacuum pumps and the water heaters also use high-pressure steam.

Ventilation System

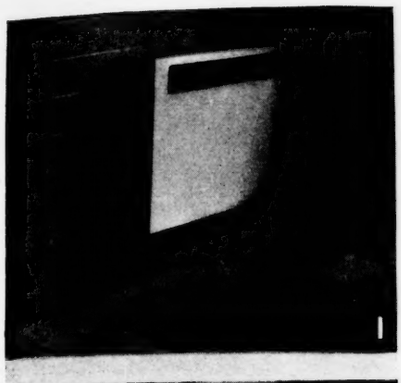
Kitchen, laundry, and the first floor clinic are supplied with air by fans located in the basement. On most of the other floors only the nurses' stations at the center of the building have fresh air supply outlets. However, all of the rooms on the fifth floor, including the bath and utility rooms, are provided with forced ventilation by fans on the sixth floor. These blowers also supply air to the nurses' stations. Dry, throwaway filters are used on all the forced ventilation systems.

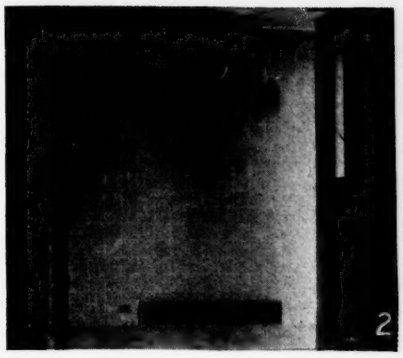
Exhaust fans, also on the sixth floor, remove fumes and odors from the kitchen, utility rooms, toilets, laundry, first floor clinic, laboratory fume hoods, and all the rooms on the fifth floor.

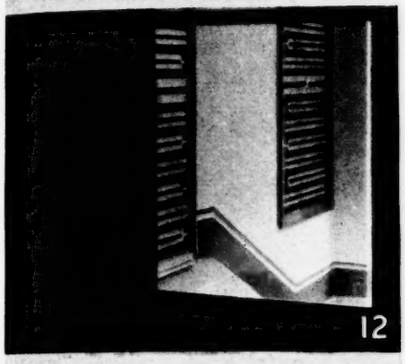
The architects were Holabird & Root; consulting architects—Berlin & Swern; heating contractor—Phillips Getschow Company; ventilation contractor—Wendt & Crone Company; boilers—John Mohr & Sons; pumps—Worthington Pump and Machinery Corporation; oil burners—Petro Nokol; radiators and Vento—American Radiator; blowers—New York Blower Company; temperature controls—Johnson Service Company.



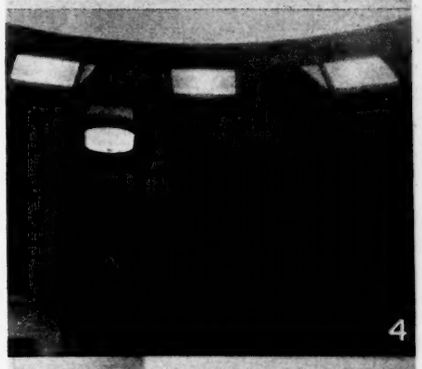
(Left) Two 7,500-gal. fuel oil storage tanks before they were covered. Steam and fuel oil pipes are shown at the top. (Center) Fuel oil heaters in the boiler room which heat the oil to 180°. (Right) The two oil burners which heat the 100-hp. boilers.

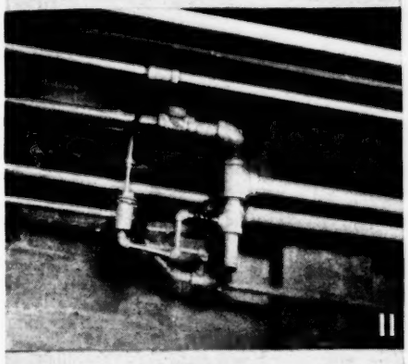


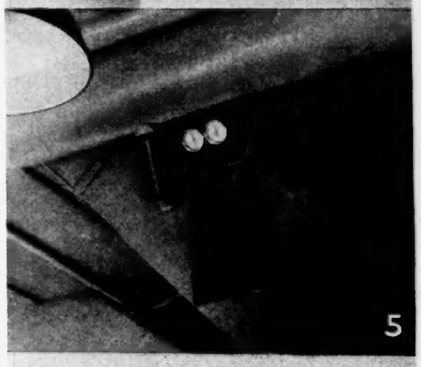


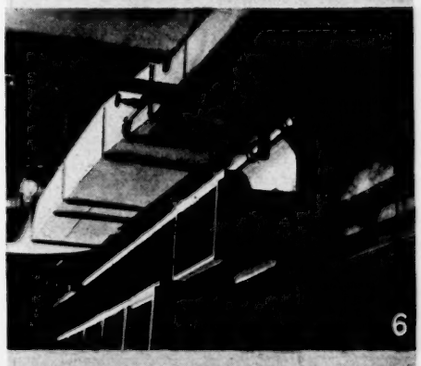


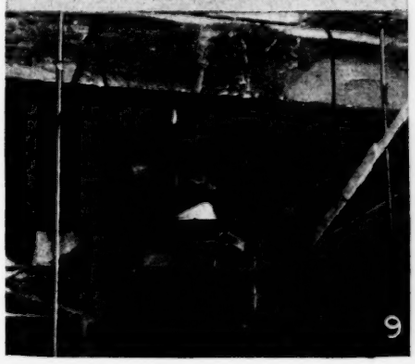
(1) Convector type radiator with a pneumatic steam valve. When the supply and return branches are concealed they are made of copper. (2) A concealed cast-iron convector as installed in an operating room. (3) Convector radiator fastened on the wall in one of the laboratories. At the right is a steam sterilizer. (4) Upper corner of the operating room showing the supply grille and lights. (5) The instruments which control one of the basement fresh air fans. They consist of a thermostat, a relay, and a duct thermometer. (6) One of the supply ducts. Avoiding the work of other contractors is always a problem. (7) One of the exhaust fans which are on the sixth floor. (8) Two supply outlets before the interior walls were erected. (9) Erecting a duct before the tiled partitions were built. (10) Welding a small kitchen exhaust hood after it is in place. (11) Radiator piping with high- and low-pressure drip traps and dirt pockets in place. Dirt pockets have not been capped. (12) Two of the artistic grilles which cover the cast-iron recessed radiators in the entrance hall.











GETTING DOWN TO FUNDAMENTALS

2—Inside and Outside Design Temperatures

BEFORE estimates can be made for either the extreme summer conditions or the extreme winter conditions, it is desirable to formulate the fundamental heat quantities in simple mathematical terms. Setting them up this way is purely for convenience and in order to let the factors be better comprehended. It has been noted in a previous discussion that the three fundamental quantities for most estimating are: (a) transmitted heat; (b) heat from filtration air; and (c) heat from ventilation air. If these three quantities can be determined at the same time, their sum gives the total quantity of heat against which the installation is planned. Where there are special loads these must also be added or subtracted as the case requires.

Fundamental equations for each of the three heat quantities are usually set up as follows:

$$\text{Transmitted heat} = H = AU\,(t_i - t_o) \qquad (1)$$

$$\text{Heat from filtration air} = F = \frac{C\,(t_i - t_o)}{55} \qquad (2)$$

$$\text{Heat from ventilation air} = V = \frac{C_v\,(t_i - t_o)}{55} \qquad (3)$$

In these equations: H, F, and V are all in B.t.u. per hour:

- A = Area, sq. ft. of surface through which heat passes;
- U = the transmission coefficient, air to air;
- C = volume of filtration air flowing, cu. ft. per hr.;
- C_v = volume of ventilation air flowing, cu. ft. per hr.;
- t_i = temperature of indoor air, °F.;
- t_o = temperature of outdoor air, °F.;
- 1/55 = .018 = heat to raise 1 cu. ft. of air at 70° one degree F.

With these three equations placed so close together it is easy to note their resemblances and their differences. All are alike in that they make use of both the temperatures of the air inside and outside. So do all of them contain at least one factor that depends on the building dimensions, construction, or occupancy. Equations (2) and (3) are exactly alike in form, as is to be expected, but differ materially in the way they are used in various problems. Equation (1) is different in form, nature, and theory from the other two.

All three are in common use, all are approximations to some extent, all depend on assumptions, and all are modified and often shortened as actually applied. Moreover, all of them are limited in their scope and each may lead to utterly absurd conclusions if improperly applied. For these reasons it is essential that their fundamentals and the nature of the assumptions made in applying them be thoroughly understood.

Before any of the equations can be used we must have values of each term to put into the equation. Let us now turn attention to these several terms and note what is available, what the commonly used figures represent, where they come from, and how they fit so far as fundamentals are concerned.

Since the inside and outside air temperatures occur in all these equations let us consider them first.

Winter Inside Temperature

In the winter season it is customary to consider that 70° is the inside air temperature to be used in *estimating the heat quantities for design purposes*. Note carefully that the figure is for use in estimating. It should not be confused with the dry bulb temperature which is to be *maintained* inside the heated building. For such purposes and for purposes of setting up written guarantees, preparing written specifications, or for maintaining "comfort," tables similar to Table 1 are sometimes used.

Such a table is useful for its intended purpose but it is doubtful if there is any justification for using

TABLE 1

INSIDE DRY BULB TEMPERATURES TO BE MAINTAINED FOR WINTER COMFORT

(Often used in written guarantees though not necessarily design temperatures. Temperatures measured at 5 ft. level—Humidity 40-60%)

SUB TEMPERATURE	
Rooms where occupants are usually active, either at physical work or play	Degrees
Gymnasiums	55-65
Kitchens	65
Playrooms	60-65
Ballrooms	65-70
Stores	65-70
Factories—light	60-65
Factories—heavy	50-60

NORMAL TEMPERATURE	
Rooms where occupants are usually sitting and conventionally clothed, at work or play	Degrees
Offices	68-72
Living rooms	68-72
Classrooms	68-72
Theaters	68-72

HIGH TEMPERATURE	
Rooms where patients are ill, unclothed, or sub-normally active	Degrees
Hospital rooms	70-80
Operating rooms	75-90
Bathrooms	70-80
Steam baths	110-120

TABLE 2

INSIDE CONDITIONS TO BE MAINTAINED FOR SUMMER COMFORT

(For cities such as New York and Chicago, located at about 42° latitude)

	CONSTANT DEWPOINT—57°			CONSTANT R.H.—50%		EXPERIMENTAL METHOD—NO. 1			EXPERIMENTAL METHOD—NO. 2		
OUTSIDE DRY BULB	DRY BULB	WET BULB	RELATIVE HUMIDITY	DRY BULB	WET BULB	DRY BULB	WET BULB	RELATIVE HUMIDITY	DRY BULB	WET BULB	RELATIVE HUMIDITY
100	—	—	—	82.5	69.0	—	—	—	82.5	66.0	42.0
95	80.0	65.0	45.0	81.0	67.7	81.0	66.0	45.0	80.0	65.0	44.0
90	78.0	64.5	47.0	79.5	66.5	78.5	66.0	51.0	77.5	64.0	48.0
85	76.5	64.0	50.0	78.1	65.3	77.0	65.0	52.0	75.0	63.0	51.0
80	75.0	63.5	51.0	76.7	64.0	76.5	65.0	54.0	75.0	63.0	51.0
75	73.5	63.0	53.0	75.3	63.0	74.5	64.0	57.0	—	—	—
70	72.0	62.5	60.0	74.0	62.0	73.0	63.0	59.0	—	—	—

these temperatures for estimating. Formerly 70° was almost universally used. More recently methods using variations have been advocated although there is no way of knowing how generally they have been adopted.

When we consider that a 5° variation from 70°, either upward or downward, makes no more than a 5 to 7% difference in the usual estimate, it can be seen why it is fundamentally sound to use a temperature of 70° for all ordinary cases; only in extraordinary cases need other figures be used. There will be very few such cases. Where they occur Table 1 can be used as a guide.

There has always been a question as to where 70° originally came from, and those interested in fundamentals have often questioned it. So far as known there is nothing any more fundamental about it than that it is an experience figure. As such it has a long record of use in this country. In the absence both of any better figure and also of any serious complaints regarding plants built and operating successfully after having based the design on it, the fact may be assumed that it is reliable.

Inside Summer Temperatures

When we come to summer inside dry bulb almost the opposite is true. Instead of there being a reliable index temperature with a long record to go by there is almost nothing—scarcely even an agreement in thought. So far, experience has brought out definitely that 70° is too low a dry bulb to aim at in most buildings with the humidities commonly occurring. There is growing evidence that an indoor dry bulb in summer of 80° with humidities ranging from 40 to 60% may come to occupy a position analagous to that occupied by 70° with like relative humidities in winter.

Evidence is also accumulating to point to the conclusion that the desirable temperatures to be *maintained* depend on essentially the same factors as do those in winter. There is still much doubt though as to how these factors work out. Some little research work has been reported on the subject in a few types of buildings but it is not yet conclusive.

Again, as in the case of the winter dry bulb for design, the summer dry bulb *for design* should not be confused with the dry bulb to be *maintained*. They may or may not be the same—usually not.

Unlike the winter dry bulb temperatures for design purposes, it is important that the design temperature in summer be placed with care. Equipment for summer use is still high in cost and since the cost depends directly on the design temperature chosen it is current practice to place it at as favorable a point as good results will permit. There is now no accepted practice on the point. Tables similar to Table 1 have been prepared but it should be clearly understood that they show the maintained conditions, not the design condition. One such table is shown herewith (Table 2). It shows four different sets of values of inside temperatures to be maintained at various outdoor dry bulb temperatures. Each set of values is in use to some extent as though they were design temperatures. In the absence of any better information such use is justified. Fundamentally, so far as known at present, there is little to guide the user in making his choice among the four sets of values set up in the table. It is apparent though that there will be a considerable difference in the capacity of equipment for cooling sized on the basis of the four sets of values given.

Fundamentally, too, it is evident that all the figures are subject to the weakness that they are not really design figures at all but are operating figures based on experiment in one or two localities only. What little information is available points to the conclusion that inside comfort conditions are dependent on locality with latitude an important factor. Certainly experience indicates that New Orleans people would not consider as comfortable the same temperatures which would satisfy Bostonians. Ultimately, therefore, indoor summer conditions will probably have to be explored in each locality.

So also it is likely that local people will move to fix design conditions *by agreement* probably based to some extent on considerations of maximum comfort locally. This has been done now in isolated cases. Among these is Chicago where one group has set the inside conditions for design purposes at 80° and 55% when the outside conditions are 95° and 40%.

We can summarize the foregoing by stating that winter inside dry bulb can be taken as 70° without serious question for use as (t_i) in equations (1), (2), and (3) for estimating, and that small variations from this temperature are probably not worth while in cal-

TABLE 3—Outside Temperatures and Wind Velocities in Summer and Winter in 96 Cities

State and City	WINTER			SUMMER		
	Lowest[1] Recorded Temp., °F.	Design[2] Temp. Actually Used, °F.	Average Wind-Vel. and Direction, m.p.h.	Design[3] Dry Bulb Temp., °F.	Design[3] Wet Bulb Temp., °F.	Average Wind-Vel. and Direction, m.p.h.
Alabama						
Birmingham ..	— 10	10	8.6 N.	93	77	5.2 S.
Mobile	— 1	20	8.3 N.	94	78	8.6 S.W.
Montgomery ..	— 5	15				
Arkansas						
Fort Smith ...	— 15	— 15	8.0 E.			
Little Rock ...	— 12	0	9.9 N.W.	95	77	7.0 N.E.
California						
Los Angeles ...	28	30	6.1 N.E.	88	70	6.0 S.W.
Sacramento ...	17	30				
San Francisco..	27	30	7.5 N.	85	68	11.0 S.W.
Connecticut						
New Haven ...	— 15	— 5	9.3 N.	88	74	7.3 S.
Dist. of Columbia						
Washington ...	— 15	0	7.3 N.W.	95	78	6.2 S.
Florida						
Jacksonville ...	10	27	8.2 N.E.	94	78	8.7 S.W.
Pensacola	7	20				
Georgia						
Atlanta	— 8	10	11.8 NW	91	75	7.3 N.W.
Macon	7	10				
Savannah	8	20	8.3 NW	95	79	7.8 S.W.
Illinois						
Champaign	— 25	— 10				
Chicago	— 23	— 10	17 S.W.	95	75	10.2 N.E.
Rockford	— 26	— 10				
Indiana						
Ft. Wayne	— 24	— 10				
Indianapolis ..	— 25	— 5	11.8 S.	90	73	9.0 S.W.
Terre Haute ..	— 18	— 10				
Iowa						
Davenport	— 27	— 10				
Des Moines ...	— 30	— 15		92	74	6.6 S.W.
Sioux City	— 35	— 18	12.2 NW			
Kansas						
Wichita	— 25	— 5		95	77	
Topeka	— 25	— 5				
Kentucky						
Louisville	— 20	— 5	9.3 S.W.	94	75	8.0 S.W.
Louisiana						
Baton Rouge ..	2	20				
New Orleans ..	7	25	9.6 N.	94	79	7.0 S.W.
Maryland						
Baltimore	— 7	0	7.2 N.W.	93	76	6.9 S.W.
Massachusetts						
Amherst	— 22	0				
Boston	— 18	0	11.7 W.	88	73	9.2 S.W.
Fitchburg	— 17	0				
Nantucket	— 6	0				
Michigan						
Detroit	— 24	0	13.1 S.W	93	73	10.3 S.W
Saginaw	— 23	0				
St. Joseph	— 21	— 10				
Minnesota						
Minneapolis ...	— 33	— 15	11.5 NW	84	72	8.4 S.E.
Rochester	— 42	— 20				
Missouri						
Kansas City ..	— 22	— 10		92	75	9.5 S.
St. Louis	— 22	— 5	11.8 NW	95	78	9.4 S.W.
Nebraska						
Omaha	— 32	— 20		94	75	
New Hampshire						
Concord	— 35	— 10	6.0 NW			
New Jersey						
Atlantic City ..	— 9	0	10.6 NW			
Dover	— 21	0				
Jersey City ...	— 12	0				
Newark	— 13	0				
Paterson	— 13	0				
Trenton	— 14	0		95	76	10.0 S.W.

State and City	WINTER			SUMMER		
	Lowest[1] Recorded Temp., °F.	Design[2] Temp. Actually Used, °F.	Average Wind-Vel. and Direction, m.p.h.	Design[3] Dry Bulb Temp., °F.	Design[3] Wet Bulb Temp., °F.	Average Wind-Vel. and Direction, m.p.h.
New Mexico						
Albuquerque ..	— 10	0				
New York						
Albany	— 24	— 10	7.9 S.	90	74	7.1 S.
Binghamton ...	— 28	— 5				
Buffalo	— 21	0	17.7 W.	83	72	12.2 S.W.
Elmira	— 24	— 10				
New York	— 14	0	17.1 NW	95	75	12.9 S.W.
Syracuse	— 24	— 2				
North Carolina						
Greensboro	— 2	20				
North Dakota						
Bismarck	— 45	— 30	— N.W	88	69	8.8 N.W.
Fargo	— 48	— 30				
Ohio						
Cincinnati	— 17	— 5		95	78	6.6 S.W.
Cleveland	— 18	0	14.5 S.W	95	73	9.9 S.
Dayton	— 16	0				
Oklahoma						
Oklahoma City.	— 17	5	12.0 N.	96	76	10.1 S.
Oregon						
Portland	— 2	5	6.5 S.	83	65	6.6 N.W.
Pennsylvania						
Erie	— 16	5				
Harrisburg	— 14	0				
Lancaster	— 27	0				
Philadelphia ..	— 11	0	11.0 NW	95	78	9.7 S.W.
Pittsburgh	— 20	0	13.7 NW	91	73	9.0 N.W.
Scranton	— 19	— 5				
Uniontown	— 22	0				
York	— 17	0				
Rhode Island						
Providence	— 17	0	14.6 NW	85	73	10.0 N.W.
South Carolina						
Charleston	7	20	11.0 N	94	80	9.9 S.W.
Columbia	— 2	10	8.0 N.E.	100	78	
South Dakota						
Aberdeen	— 46	— 20				
Tennessee						
Chattanooga ..	— 10	0		94	76	6.5 S.W.
Nashville	— 13	0				
Texas						
Dallas	— 10	10		99	76	9.4 S.
Ft. Worth	— 24	14	11.0 NW	95	75	
Houston	— 5	20		93	79	7.7 S.
San Antonio ..	4	20	8.2 N.	100	78	7.4 S.E.
Utah						
Salt Lake City.	— 20	0	4.9 S E	95	67	8.2 S.E.
Vermont						
Burlington	— 30	— 10	12.9 S	85	71	8.9 S.
Virginia						
Lynchburg	— 7	0	5.2 N.W.			
Richmond	— 3	10	7.4 S.	95	78	6.2 S.W.
Washington						
Seattle	3	10	9.1 S.E.	83	61	7.9 S.
Spokane	— 30	— 10	5.2 S.W	89	63	6.5 S.W.
Tacoma	7	10				
Walla Walla ..	— 29	— 10				
West Virginia						
Wheeling	— 25	0				
Wisconsin						
Madison	— 29	— 15		89	73	8.1 S.W.
Milwaukee	— 25	— 17	11.7 W.	93	74	10.4 S.
Sheboygan	— 38	— 10				
Wyoming						
Laramie	— 42	— 10				
Sheridan	— 45	— 30	5.3 NW			

[1]As reported in publications of U. S. Dept. of Agriculture, Weather Bureau, covering long periods, 20 to 50 years, including winter of 1933-34. [2]As reported by readers of HEATING AND VENTILATING. [3]Collected from various published sources.

culating. They are more likely to give an *impression* of greater accuracy than actually to result in any real increase in accuracy. In the case of the summer dry bulb, there is as yet no generally agreed upon figure for use, although there is an increasing tendency to use 80° as the design figure. Figures from Tables 1 and 2 can be used where there seems to be some reason for doing so.

Outside Winter Temperatures

The outside dry bulb for use in winter design has never been definitely standardized. Zero degrees is the figure most widely used. Some estimators use it in all calculations regardless of where the building is located, although this can scarcely be considered good current practice. The theory of placing the temperature for design purposes has never been fully worked out. There is, however, general agreement that no justification exists for placing it at the lowest observed temperature in a given locality. To do so would result in a plant unnecessarily large since (a) the lowest observed temperature is reached but seldom, and (b) a properly designed plant has some reserve capacity fixed by other considerations and which is sufficient to supply the demand at the infrequently occurring extreme cold spells. Extreme low temperatures also usually occur at a time of day when the plant is not normally operating at capacity and are of short duration.

In the absence of any well-worked-out principle based on reasoning, common practice falls back on rules based on experience or else experience builds up a more or less informal standard. There are several of these.

One uses the average of the lowest observed temperatures at a given locality for each year of a 10-year period. Another uses a temperature arbitrarily set at some figure above the lowest temperature ever recorded at the locality—with 10 to 15° above this observed minimum as the range most commonly advocated and used. Still another does almost the same except that instead of using the *record* low temperature of the locality the low temperature recorded for a period of 10 years is used.

It will be seen that these methods all resemble each other and that all make use of the lowest temperatures in some way. In other words, there is tacit agreement that the outside design temperature in winter depends on the extreme low of the locality but little agreement as to exactly how to make use of the figure. Neither is there any way of concluding which of the rules is most nearly correct in practice.

It has been repeatedly observed that wind velocity has an effect on the size of winter plant required. To make allowance for this some estimators make use of design temperatures intended to compensate for it. A rough rule is that one mile per hour increase of wind velocity is the same in effect as 1° drop in temperature. On the whole it can be stated that information on the effect of wind on heating, and on the weight which should be given to it in calculations, is in such a state that little dependence can be put on the data. It is doubtful if anything real is gained at present by attempting to take wind velocity into account in calculations or in attempting to fix values of t_o.

Several attempts have been made to standardize on the outside winter design temperature. These have on occasion taken on the form of complete rules for calculating. They have, however, not come into wide enough use to consider that they are really standards of actual practice.

Some years ago readers of HEATING AND VENTILATING supplied figures showing the design temperatures which they use in their work.[1] It is believed that they represent as good figures for practical use as any in view of the confusion surrounding the whole subject. These figures are given in the second column of Table 3. For those who wish to use methods based on lowest recorded temperatures, these figures are also given in the first column of Table 3.

Outside Summer Conditions

Fixing the outside summer dry bulb for design purposes is troublesome because of the importance of also placing the wet bulb. There is a lack of authentic data as to the simultaneous readings of wet and dry bulb temperatures in many localities. Very few of the stations of the Weather Bureau are equipped with recording instruments for measuring both temperatures. The usual procedure at the stations of the Bureau is to measure the temperature and humidity at intervals only and the time of the reported readings of dry bulb and humidity do not coincide. With the rise of a demand for summer design figures, tables have appeared in various places giving what are said to be suitable values for use for this purpose. One set of such values is included in Table 3. The values were collected from several published sources and are believed to be the best in existence at present. There is no evidence as to what extent these figures are actually in use by those making estimates for summer installations in the several cities listed.[2]

It may be stated that the design figures have little experience to support them and that changes may be expected from time to time as experience accumulates. In some few cities those most interested have made moves to establish local standards by agreement. More of these movements are anticipated.

So far as fundamentals are concerned, it is evident to anyone who looks over existing standards, rules, and practices for arriving at figures for inside and outside temperatures for use in calculating, that experience plays a greater part in fixing these values than do any other factors. To the fundamentalist there is little of solid foundation in any of the figures or rules now in use in either summer or winter determinations. There is, however, some weight of experience to indicate that the figures in use are not positively unsatisfactory although there is still much room for improvement.

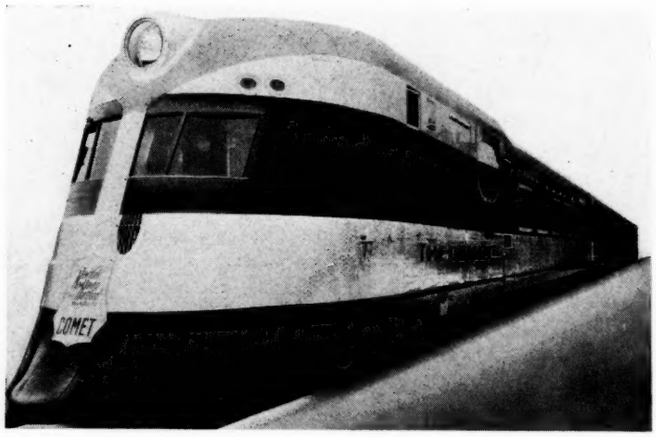
[1] See "Selecting the Design or Outside Temperature for Heating Calculations," HEATING AND VENTILATING, May, 1933, pages 33-36.

[2] Readers could be of considerable help in standardizing the design temperatures if they would write HEATING AND VENTILATING supplying missing information or correcting existing figures.

New Haven's "Comet" Completely Air Conditioned

By A. J. SCHOCH†

AN air conditioning system having a refrigeration capacity of 14 tons is a feature of the New Haven's new 100-mile-an-hour diesel-driven train. Two compressors are driven by direct connected d.c. motors of 12 hp. each. One of these power units, together with its condenser and liquid receiver, is mounted in each of the power compartments at the ends of the train. The compressor and motor are mounted on a common bedplate which in turn is mounted on the car floor. The condenser is divided into two sections. A section is located on each side of the car at the intakes for the air to the engine cooling radiators. With the volume of air required by these radiators passing through the condenser, pressures will be kept to minimum values under adverse conditions.



Normally the compressor motor receives its power from the auxiliary generator. When the engine is idling, the reduced voltage of the auxiliary generator results in a corresponding reduction in air cooling. For precooling the train or during long station stops, if full output is desired, the compressor motor is transferred to the main generator. This transfer is brought about by pressing a push-button located conveniently to the engineman.

Two air conditioning units are provided for each car of the train, two being employed in order to obtain maximum head room under the unit. Each unit consists of the refrigerating evaporator coils, heating coils, fans and motors, the expansion control apparatus and the drip pan. Two units are mounted side by side in the center of the car directly over the entrance. On account of the greater seating capacity of the center car, the two units have a cooling capacity of 2½ tons each. For the end cars, the units have a cooling effect of 2 tons each. Each 2½-ton unit circulates approximately 1000 c.f.m. and the 2-ton unit circulates approximately 800 c.f.m.

An unusual scheme is provided to control automatically the operation of the two compressors and six air conditioning units. One compressor unit normally supplies the two air conditioning units in the power car and one air conditioning unit in the middle car. Cooling thermostats with three tubes for low, medium, or high setting control the operation of the compressors. Each compressor unit is controlled by two thermostats, one located in the passenger compartment of the power car and the other in the middle car. The cutting in of either of the two thermostats starts the compressor unit which it controls. However, both thermostats must cut out to shut down the compressor unit. On the other hand, the outputs of the air conditioning units are controlled separately. For instance, while the cutting out of the thermostat in the power car does not shut down its compressor unit, it does cut out the air conditioning units in that car. This is brought about by closing off the refrigerant to these air conditioning units. The thermostats control the operation of electro-magnetic valves in the refrigerant line. Thus the eight separate units (two compressor units and six air conditioning units) are automatically controlled by three thermostats, one located in the passenger compartment of each power car and one located in the middle car. Furthermore, any desired temper-

(Concluded on page 74)

Interior of the air conditioned Comet

†Application Engineer Westinghouse Electric & Mfg. Co.

Effect of Soot on Heat Transmission in Small Boilers†

By P. NICHOLLS[1] and C. E. AUGUSTINE[2]

A LAYER of soot on the heating surface of a boiler decreases efficiency because it increases resistance to the flow of heat, with the result that the heat transfer to the water is lower and the temperature of the flue gas higher than they would be if the surfaces remained clean. The percentage of reduction in heat transfer depends on the position and area of the sooted surfaces, the thickness of the soot, and the percentage of the total heat absorbed by those surfaces when clean; thus it will vary with the type of boiler and in particular with the ratio of the area of the convection heating surface to the total area.

Medium-size and large boilers usually are equipped with soot blowers, and tests have been published giving the increase in efficiency resulting from removal of the soot. Fuel savings up to 8% have been reported, but 4 to 5% is probably more conservative. However, these savings may not be due wholly to a reduction in the thermal resistance of the surfaces but may be due partly to improvement in the combustion because of better draft or more uniform flow of the gases.

There are no corresponding test data on small boilers operated at low rates of burning. In small boilers, deposits are much thicker, and it might be expected that the reduction in efficiency would be greater; in fact, statements have appeared suggesting that the decrease may be as high as 50%. This investigation was undertaken because the Bureau frequently receives requests for authoritative information on the effect of soot in small and other heating boilers.

To obtain accurate values it was necessary that there be very close control of test conditions and exact measurements. The work therefore had to be done in the laboratory and boilers that were available and suitable used. The tests were limited to two round, cast-iron sectional boilers with 20- and 24-in.-diameter firepots. The work was restricted to the phase of heat transfer (that is, to the insulating effect of soot deposits) and did not directly include the waste of fuel under service conditions due to decrease in the available draft caused by clogging of the passages or flues, resulting in poor or incomplete combustion.

Little definite information is available on the thermal conductivity of soot. Deposits vary so much in density and composition that heat transmission tests of samples would have little practical value; moreover, deposits invariably contain some ash and sometimes are almost entirely ash. The resistance of the soot layer is in series with the surface resistances between the soot and the hot gases and between the metal and the water; although values for these resistances are available, provided the conditions associated with them can be defined, the nature of the surface of the soot exposed to the gas is indefinite enough so that tests for heat transfer would have to duplicate service conditions.

One investigator reports the results of what he acknowledges to be crude tests. He placed a pan of water on an iron plate heated by a small oil stove and determined the time necessary to raise the temperature of the water the same amount with various thicknesses of soot on the underside of the plate. He deduced that the loss of efficiency, compared with the transfer without a coating of soot, for various thicknesses is:

Thickness of soot, in. ...	1/32	1/16	1/8	3/16
Loss in efficiency, %....	9.5	26	45	69

In the absence of other data, these values have been frequently quoted, sometimes with the inference that the efficiency of the whole boiler will be reduced by the values given. This is incorrect for two reasons: (1) the soot deposits are confined to the portion of the boiler surfaces not exposed to the flames; in domestic furnaces, soot may be deposited on the surfaces of the combustion chamber during periods of low ratings, but during that time only a very small quantity of fuel is burned and the efficiency of combustion is so low that additional loss due to soot is of small importance; when the rate is increased, the soot in the firepot is burned, although sometimes the surfaces may be coated with a thin layer of charred tar which takes a long time to loosen. (2) Even with a clean boiler the greater part of the heat transfer occurs through the surfaces of the firepot, and this will not be affected materially by the cleanness of the boiler. For example, earlier work on the 20-in. boiler used in these tests showed that the average efficiency with coke and anthracite was 62% when the assembly consisted of the firepot and dome only and 72% when the assembly included three intermediate sections. Thus the three sections accounted for 10 out of the 72%, or 14%, of the total heat delivered. If the soot deposit reduced the transfer to the sections by 50%, the percentage loss caused by soot would be half of 14, or 7%, of the available heat. Thus it may be expected that soot deposits will not cause an abnormal loss of efficiency because of their insulating effect on the heating surfaces.

To obtain the desired results it was necessary to use somewhat novel test methods, summarized as follows:

(1) Two boilers were tested, both of the round cast-

†Extracted from U. S. Bureau of Mines Report of Investigations 3272. Copies may be obtained from Bureau of Mines, Washington, D.C.

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iron type with three sections. The methods used were the same in both boilers.

(2) The tests simulated a heat transmission test in which hot gases of a definite weight per hour and a definite temperature were passed through the boiler; the heat transfer was determined from the heat delivered and from the temperature of the gases leaving the boiler.

(3) This was accomplished by burning high-temperature coke, supplying a definite total weight of air per hour, and continually adjusting the rates of primary and secondary air so that the CO_2 content of the flue gases was constant for 5 hr. and was the same in successive tests.

(4) In the first test the heating surfaces were thoroughly cleaned. The sooting was then accomplished as an independent operation by burning coal in the normal manner with natural draft. After a light sooting another test was made, after which the boiler was further sooted and again tested; this was repeated until no further increase in soot was possible. Finally the boiler was again cleaned and retested.

Table 1 summarizes the results of the tests; it shows the heat loss—that is, heat not absorbed by the boiler—caused by various degrees of sooting, expressed as a percentage of the heat made available to the boiler by the burning of the fuel.

TABLE 1

HEAT LOSS CAUSED BY SOOT EXPRESSED AS A PERCENTAGE OF THE HEAT MADE AVAILABLE BY THE BURNING OF THE FUEL

DEGREE OF SOOTING	20-IN. BOILER		24-IN. BOILER	
	Test No.	Heat Loss, %	Test No.	Heat Loss, %
Clean	1	0	1 and 2	0
Slight (1/8 in.)	2	3.0	3	1.5
Medium (1/4 in.)	3	4.9	4	4.2
Heavy	4	6.4	5	4.2
Heavy	5	5.7	6	4.7
Heavy	6	5.0	8	5.3
Heavy	7	6.6	—	—
Clean	8	0	7	0

The designations given for the degree of sooting are general because the thicknesses were not uniform over any one area and decreased along the path of the gases. Although no attempt is made to distinguish between the deposits designated as heavy, the quantity of soot was greater with successive sootings but mainly consisted of clogging of the passages.

The loss with both boilers increased with an increase in the quantity of soot. The loss with the 20-in. boiler was greater than with the 24-in. one; this is logical because the ratio of area of surface to cross-section of the gas stream increases with a decrease in diameter.

The loss with the first thin layer of soot is greater than that with further increases in the quantity deposited. This may be due to the fact that the surfaces of the firepot were cleaned, and the layer of tar deposited on these may have decreased their ability to absorb the radiation from the fuel bed.

The maximum loss in any test was 6.6% with the 20-in. and 5.3% with the 24-in. boiler. The deposits in these tests were very heavy and more than would be tolerated in service.

It is legitimate to question whether these tests, made under certain arbitrarily fixed conditions, give values that are representative of the average condition under which furnaces are operated. In these tests the CO_2 content was higher; that is, there was less excess air than is usually found in service, and they did not include the period after a firing when the surface of the bed is dull and there is little radiation. It would require rather extensive work to answer such questions by experimentation. However, the quantity of heat absorbed by the secondary (or convection) heating surfaces is roughly proportional to the product of the weight of the gases and the difference in temperature between the gases and the surface, and this product tends to remain constant for a given rate of heat liberation, independent of the quantity of excess air. The rates of burning used in these tests—2½ and 3 lb. per sq. ft. per hr.—were selected because they are about the seasonal average of those used in household furnaces and may be expected to give a fair average value for all conditions that exist during the heating season.

It should be noted that the loss of heat has been expressed as a percentage of the heat made available and not of the heat in the fuel. The heat made available is equal to the heat in the coal minus the heat in the combustible lost to the ashpit and the heat in the unconsumed combustible in the gases; therefore, the loss due to soot expressed as a percentage of the coal burned will be less than the values given in Table 1. The average loss to the ashpit can be taken as 4% of the combustible in the coal; the loss of combustible in the gases will vary widely with the season of the year and the method of firing and care taken, but a value of 8% may be a general average. This makes a total of 12%, and the loss expressed as coal fired would be the values given in Table 1 multiplied by 0.88, which would reduce the maximum of 6.6 to 5.0%.

It was recognized that a limited number of tests of two boilers would no more than indicate the order of the losses caused by soot in boilers, but it is probably safe to make the following generalizations with reference to heating boilers:

(1) The tests showed that in round, cast-iron boilers with three intermediate sections, that is, a ratio of effective secondary to total heating surface of about 0.4, operated at the average rate for a heating season, the insulating effect of deposits of soot decreased the heat absorbed by the boilers 2 to 7% of the heat made available by the fuel, depending on the thickness of the deposit.

(2) The losses, expressed as a percentage of the coal burned, will be less and will be approximately proportional to the over-all efficiency. Thus, with 60% efficiency, about 1¼ to 4¼% of the coal will be wasted because of the insulating effect of the soot.

(3) The loss will be less as the number of sections is less.

(4) Until further tests are made these values can be accepted as applying to other types of heating boilers with the same ratio of secondary to total surface.

(5) These values do not include the waste of fuel that may result from incomplete combustion due to insufficient draft caused by the soot clogging the passages or flue, which may, and usually will be, much greater than the loss caused by the insulating effect.

Dehumidifying with Gas in a Printing Plant

AMONG the weather conditions that adversely affect production schedules as well as the quality of products produced in certain lines of manufacture are low humidity in the winter and high humidity in the summer. In fact, it might be said that these are, by and large, the two really important functions of industrial air conditioning, when used in conjunction with air cleaning or filtering.

The printing industry is an example of an art that can use to great advantage humidifying in winter and dehumidifying in summer.

The problem of variable humidities and their effect on the grade of printing work turned out by printing presses is one which has been recognized and grappled with for many years. Much lost time and imperfect impressions on account of variations of the condition of the air in the press rooms have aggravated the printer even to the point of shut-downs during unsuitable weather. Modern air conditioning has come to the rescue in this problem.

The Waverly Press, Baltimore, realized the desirability of year 'round humidity control in its plant. The condition of the paper, which changed with changes of humidity, has some bearing on the problem, but the principal difficulty was caused by variation in thickness of the cherrywood blocks on which the metal plates for making cuts are mounted prior to their being placed in the presses. These wood blocks, because of their hygroscopic nature, will contract and expand with changes of atmospheric conditions, making it extremely difficult to maintain the precision demanded in high-grade printing.

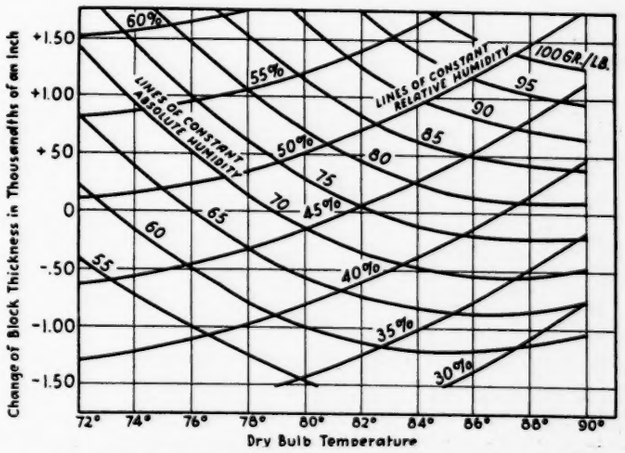
Winter control of humidity has been provided for several years in the Waverly Press, but difficulty in producing precision printing was experienced in the summer. Refrigeration could be used, but this is a roundabout and expensive method of obtaining the dehumidifying effect needed. A more direct, simpler, and less expensive method was needed. Such a method had been perfected through the use of the principle of capillary attraction whereby the high adsorption qualities of silica gel extracts excess moisture from the air. Gas heat is then used to drive this moisture out of the gel, from whence it is exhausted to the outside of the building.

This interesting pioneer installation was designed by Howard H. Tunis, research engineer of the Waverly Press, and Bayard P. Fonda, The Bryant Heater Company.

Before designing the humidity control system, it was necessary to study the exact behavior of the wood blocks with varying air temperatures and humidities. These tests naturally had to cover a period long enough to include all seasonal changes in weather and necessitated the use of equipment not available in general test work.

Mr. Tunis devised an instrument which for want of an established name was called a "hygro-xylometer."[1] In order to check the effect of the air on the blocks, hygro-xylometer readings were taken regularly in the composing room and in the press room. The instrument consists of a cherrywood block so connected to a dial indicator that variations in a wood block 0.853 in. thick could be measured in hundred-thousandths of an inch. The results of these investigations are plotted in the drawing. In plotting these final results it was necessary to take into consideration the time of exposure, as it was found that the time element was a factor in changes of block thickness. Occasionally, there was a lag of many hours before the blocks came to their equilibrium thickness in response to a change in humidity or temperature.

An inspection of the curves discloses the rather interesting result that the absolute humidity must be increased slightly as the temperature increases to secure uniform block thickness. In other words, when the temperature increases, the consequent drop in relative humidity tends to dehydrate and shrink the wood. On the other hand, constant relative humidity with increasing temperature tends to increase the size of the blocks. Consequently, the condition required for constant block thickness is a compromise between constant absolute and constant relative humidities with changes in temperature.



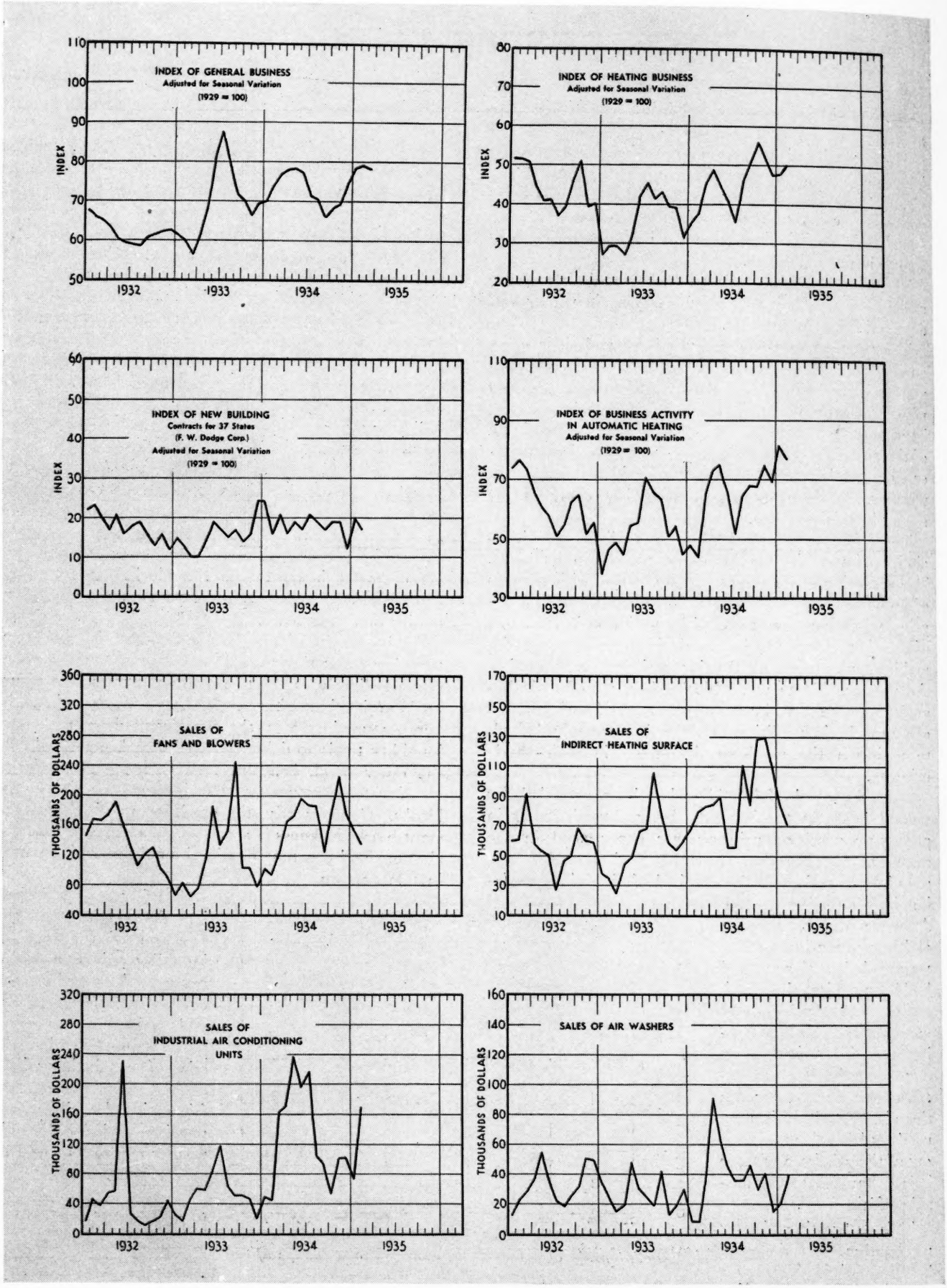
Relationship of temperature, humidity, and change of wood block thickness.

The first step in designing the system was the selection of the type of humidity reduction equipment. A series of calculations was made and estimates were prepared using several methods of producing these desired conditions. Refrigeration by direct expansion and by the air washer method, as well as

(Concluded on page 75)

[1] "Hygro-xylometer" — derived from the Greek "hygros" meaning water and the Greek prefix "xylo" meaning wood. The meaning is therefore: a meter for measuring the water content of wood.

BUSINESS TRENDS



Equipment Sales Up Sharply Over 1934

while building shows gain slightly greater than normal seasonal increase. Building loans up.

THE heating industry operated at 49.8% of the 1929 level during February, after adjustment was made for seasonal trends, according to HEATING AND VENTILATING's Index of Heating Business Activity. This is an increase of 2.2 points over the January figure, and of 12.2 points over the February, 1934, Index number.

The Index of Automatic Heating, which indicates the activity of the stoker, oil burner, and gas boiler business, dropped from 81.6 in January to 76.6 in February. The figures are in per cent of 1929 activity. This index stood at 43.6 in February, 1934.

New building in March, according to F. W. Dodge Corporation, totalled $76.8 million, a sharp increase from the $47.2 million reported for February. After adjustment is made, however, for the usual seasonal increase at this time of the year, the increase is not so startling and the adjusted index in per cent of 1929 activity rose from 17% to 19%. The non-residential building index, corrected for seasonal trend, rose from 19.1 in February to 19.5 in March, while residential building increased from 13.4 to 17.6 in February. There was a sharp increase in educational building from $5.7 million in February to $10.4 million in March, and from $0.6 million in February to $3.9 million in March in hospitals and institutions. There was also an important gain in religious and memorial buildings.

The year 1934 is the first since 1925 to show an increase over the preceding year in the number and value of buildings for which permits were issued, according to an announcement by the Bureau of Labor Statistics. Reports collected by the Bureau from 819 cities in the United States having a population of 10,000 or over indicate that the number of permits issued for construction contracts during the year increased 7.3% in comparison with 1933. At the same time, an increase of 5.5% is shown in the estimated cost of all construction in these cities. For the most part this increase was caused by increased expenditures for additions, alterations, and repairs to existing buildings for which permits were awarded. The per cent of change in number and estimated cost of buildings from 1933 to 1934 in the 819 cities covered is shown in the following table.

TYPE OF BUILDING	NUMBER	ESTIMATED COST
New residential	— 9.5%	—12.7%
New nonresidential	— 2.0	+ 1.4
Additions, alterations, and repairs	+11 6	+ 29.4
TOTAL	+ 7.3%	+ 5.5%

(Concluded on page 74)

The table below shows the number and cost of new buildings by permits in 819 cities in 1933 and 1934, by kind of building:

KIND OF BUILDING	BUILDINGS FOR WHICH PERMITS WERE ISSUED 1934 NUMBER	1934 COST	1933 NUMBER	1933 COST
Residential buildings				
1-family dwellings	20,396	$78,994,055	22,358	$84,987,866
2-family dwellings	977	5,841,003	1,267	7,134,113
1-family and 2-family dwellings with stores combined	216	1,013,207	259	1,312,039
Multifamily dwellings	320	18,947,496	364	28,828,177
Multifamily dwellings with stores combined	23	510,800	17	208,508
Hotels	3	160,000	2	102,500
Lodging houses	6	24,350	15	103,860
All others	49	2,450,670	22	1,009,709
TOTAL, RESIDENTIAL BUILDINGS	21,990	$107,941,581	24,304	$123,686,772
Nonresidential buildings				
Amusement buildings	603	$10,277,168	437	$5,296,579
Churches	401	5,808,220	324	5,742,525
Factories and workshops	1,163	18,150,747	1,046	20.653,069
Public garages	515	3,362,514	380	2,005,631
Private garages	37,935	9,104,102	40.938	9,255,892
Service stations	3,002	9,520,811	3,057	7,062,800
Institutions	124	13,034,008	87	20,863,575
Office buildings	164	14,370,968	111	5,551,977
Public buildings	351	41,432,384	169	36,889,256
Public works and utilities	393	14,558,905	251	57,534,914
Schools and libraries	482	36,529,900	98	11,866,192
Sheds	12,378	3,441,317	12,863	3,230,973
Stables and barns	686	1,120,814	496	407,077
Stores and warehouses	5,424	33,505,266	5,215	25,459,327
All others	1,104	1,561,817	545	1,043,705
TOTAL, NONRESIDENTIAL BUILDINGS	64,725	$215,778,941	66,017	$212,863,492
Total new buildings	86,715	323,720,522	90,321	336,550,264
Additions, alterations and repairs	264,506	168,910,014	236,967	130,506,357
GRAND TOTAL, ALL CONSTRUCTION	351,221	$492,630,536	327,288	$467,056,621

Engineering Provided for in Chicago Standards for Certified Air Conditioning

recently set up by the Chicago Master Steam Fitters' Association, cooperating with other groups in that city

SLOW but steady progress has been made in almost all phases of air conditioning during the last few years. For example, manufacturers of steam jet refrigerating equipment have standardized their equipment, as announced on these pages in March. From another group —the installers—came a forward move in March in the form of Certified Air Conditioning.[1]

Standards for Certified Air Conditioning for Comfort, as set up in Chicago, are published in an eight-page bulletin, copyrighted by the Chicago Master Steam Fitters' Association. Since this is the first known case of contractors having set up standards of this kind for air conditioning, this development is of importance to the entire industry. In that city the Standards were developed by representatives of the Consulting Engineers Division of the Western Society of Engineers, the Chicago Master Steam Fitters' Association, and the Ventilating and Air Conditioning Contractors Ass'n.

Air conditioning for comfort as defined by these Standards is "provision for the simultaneous control of the temperature, motion, humidity and a reduction in the dust content and odors for air employed in the ventilation of rooms. This means both winter and summer service or either service. Automatic temperature and/or humidity control is not necessarily implied." Guarantees of performance in specifications on which competitive bids are taken, where definite minimum sizes of apparatus are specified, are limited to the requirement that each piece of apparatus shall deliver the rated output of the manufacturer, and the contractor's performance guarantee covers the adjustment and coordination of the various apparatus and their capacities.

The Standards set up what shall be considered advisable outside and inside design temperatures, relative humidities, and give minimum acceptable allowances for infiltration for Chicago. Design allowances for heat gain due to sunlight are given for the eight points of the compass for different times of the day and for different types of construction, but of course apply only to Chicago. Allowances are made for shading from sunshine only where the plans and specifications specifically show such allowance.

In regard to the quantity of air introduced into the rooms, the Standards specify that for winter air conditioning the air quantity shall not be less than the requirements of the City of Chicago for ventilated rooms. The same applies to summer air conditioning with the additional provision that the design air quantity shall be sufficient to extract the surplus heat at the air inlet and outlet temperatures specified.

[1] "Certified Air Conditioning Available in Chicago; Standards Were Developed by Contractors' and Engineers' Organizations," March, 1935, page 49.

The location, shape, physical characteristics of, and air velocities and temperatures through the inlets and outlets for conditioned air to the rooms shall be such as will promote distribution of the circulation throughout all occupied portions without causing discomfort. Downward discharging air inlets in rooms shall be provided with safeguards to prevent drafts at the occupied zone and these safeguards are listed in the Standards. A further provision is that the difference of temperatures between the entering cooled air and the room air for horizontal supply openings shall not exceed 2° per ft. in height from the floor to the bottom of the opening. For down discharging inlets the entering air shall not be more than 5° colder than the room air at the approximate level of the inlet.

Refrigerating and cooling equipment is to be designed and installed in accordance with the requirements of the Chicago City Department of Boiler Inspection and Cooling Plants, rules of the Chicago Board of Health, and standards of the Chicago Master Steam Fitters' Association. Minimum acceptable capacities for the evaporator, compressor, condenser, condensing water, power, receiver, apparatus installation, and accessibility for servicing and repair are provided for in detail. This is particularly true of the loads permitted on reciprocating refrigerating compressors and for condensers, which are as follows:

MAXIMUM LOAD PERMITTED ON MULTICYLINDER RECIPROCATING COMPRESSORS WITH MAXIMUM OPERATING SPEEDS

Capacities, Not to Exceed, B.t.u. per Hr. per Cylinder	R.P.M.
Less than 25,000	400
25,000-50,000	360
50,000-100,000	290
100,000-200,000	220
200,000-300,000	175
Over 300,000	150

The normal condensing pressure shall correspond to 86° for the refrigerant used. For each 12,000 B.t.u. per hr. heat transfer the effective water cooling surface shall be not less than 6 sq. ft. for double copper pipe; 8 sq. ft. for shell and coil type with copper coil; 8 sq. ft. for shell and tube type with steel tubes and equipped with swirling devices.

The air velocity through the airway of a spray humidifier is limited to 500 lin. ft. per min. On account of the danger of noise, air velocities are limited to various parts of the system and careful provisions are made for other parts of the installation so as to reduce the amount of noise. In order to prevent air surrounding cool pipes from being chilled below its dewpoint and depositing moisture, the Standards provide for the type and thickness of insulation for various parts.

MODERNIZING SECTION

Finding Leads for Modernizing Business

A STUDY of the business practices of 50 heating and ventilating engineering and contracting firms, shows that there are at least eight rather distinct methods in successful use in finding modernizing prospects. These are: building survey, canvassing, telephone, reports, service visits, advertising, advance agents, and mechanics' reports.

Perhaps no single plan is entirely satisfactory, although all of the methods have more or less enthusiastic supporters. However, it is significant that engineers and contractors who have established the greatest number of personal contacts have the most work in hand.

The accompanying graph shows the percentages of those firms surveyed who use a given method. Most of course, use more than one method, but service calls and telephone calls are far in the lead in popularity.

In considering these methods, we find that general business conditions always exert marked influence on lead-getting methods and their relative effectiveness. In the matter of canvassing, as an example, in pre-depression years the "cold" canvass was an effective method. This cannot be said to be true at present. If uninvited calls are to be made, the contractor goes over his list carefully in advance, culling out those known to be without funds, leaving the names of those known to be friendly or well able to purchase.

Granted that now, as always, personal contacts are desirable, canvassers do well to make visits on the regular customer list first. The name of the contractor already is known, friendly relations have been established. Calling on these people is much like dropping in on old friends and cannot give offense in the event of inability to sell. The selected list method, naturally, means some time lost by sales representatives in getting from one to the other, but in the long run is considered less wasteful of time than making indiscriminate visits.

The older method of canvassing was sometimes called "round the block" calling. Here the salesmen called on all buildings as encountered, one after another, until all buildings on the four sides of the block had been visited, then making similar calls in the adjacent blocks. This idea followed out an old theory that best results were derived from making as many contacts as possible, a constant percentage of which were relied on as ultimate buyers.

The rank attained by the most popular method, making service calls, bears out the idea of selected lists. Incidentally, when salesmen are conversing with owners it is found effective to ask for the names of friends and neighbors who might prove good prospects for new, similar installations. Such names usually are provided and are held to make up a good fresh prospect list.

Heating and ventilating contractors who are actively promoting the sale of oil burners, gas heating, stokers, and air conditioning units and attachments usually follow the call-back method and find it productive. A variation is the making of service contracts with those who purchase appliances, either on a monthly or yearly basis.

Such service work rarely proves very profitable but should be self-sustaining and the personal touch with owners thus provided is valuable in many ways. It is considered unwise to shun service contracts because this transfers the contact from the contractor to neighborhood mechanics, handymen, and others who may have it in their power to mishandle service in such a manner as to reflect discredit on the equipment originally sold by the contractor.

If correctly done use of telephones is profitable. If wrongly used, the telephone method is positively harmful. The voice without the smile, the call during meal hours, early morning calls, the brusk, hurried inquiry are resented. This, however, need not mean that excellent results cannot be accomplished by telephoning those already known, satisfied customers, appointment making when written inquiries have been made, and like usage.

A method followed by a number of contractors is the almost daily 'phoning to architects and consulting engineers, real estate operators, and financial institutions to ask if new modernizing projects are known and if so what prospects there are for them to prepare estimates. Here the telephone is a great time saver and considered as effective as making personal

MODERNIZING SECTION

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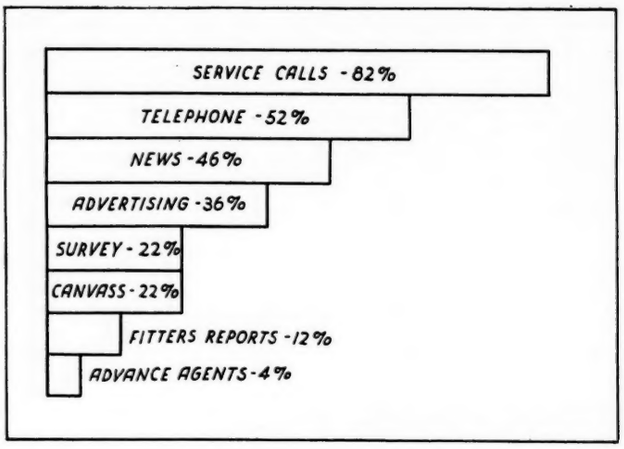
visits. Direct-mailing of advertising matter always should be followed either by personal visits or by telephoning for appointments, and best results come from announcing in final mailings that calls soon will be made, some contractors announcing dates of such calls in the mailed literature.

Direct-mailing without follow-up is found to be, in general, a wasteful procedure. Two contractors reported that from 1,000 to 10,000 pieces had been mailed without a single reply. Current reluctance to purchase is in part to blame and this might not be true in better times. Experience indicates, on the other hand, that mailing catalog matter without subsequent personal contact is inadvisable.



The percentage of contractors surveyed using different methods of getting business. All contractors used more than one method, the average being nearly three different methods for each contractor.

A third of the contractors interviewed report that they can secure modernizing business through display advertising. The most effective method of advertising appears to be the classified telephone directory, depending on whether the firm is located in city or suburban territories, those obtaining the best results being city contractors. One contractor stated that practically all inquiries for modernizing are derived from directory listing and personal contacts with previous customers, while another finds that the 1-in. space used by him in the "Red Book" yields profitable returns.

Experiences vary widely as to the value of building reports, periodical news columns, clipping bureaus, and like announcement sources. There is a marked tendency of large contractors and consulting engineers to extract valuable information from such reports, then dictate letters to officials mentioned, offering their services. While such returns are not great in proportion to the number of letters sent out, results are often held to justify the effort.

Cold canvasses are still in favor with many contractors. In general, this method is most used by contractors handling burners, stokers, and air conditioning units. A variation of the cold canvass is to give rather widespread preliminary mailing of illustrated advertising material so that the product and the contractor's name are at least known in advance.

Whether personal visits are selected or indiscriminate, there are a number of contractors as well as engineers who endeavor to secure opportunities to make expert surveys of mechanical equipment in use, the object being to point out shortcomings and offer modernizing. A variation of this method is to have steamfitters make preliminary surveys. In one instance gas company meter readers are requested to report on equipment observed and its condition. One contractor has his fitters call on the two adjacent building owners, right and left, of all buildings in which they are performing ordered work. Thus each mechanic turns in at least two surveys daily and when they handle several jobs daily they may produce four or more surveys daily.

Many contractors have tried the lead-getting method of employing advance men, or cold canvassers, allotting one man to each regular salesman. It is the object of such advance agents to obtain permission to make preliminary surveys, then making appointments for subsequent interviews by the salesmen. Replacement boilers, oil burners, and other modernizing sales of importance have been made in this manner.

It is the experience in all of the cases studied that uninvited visits on total strangers are neither effective nor welcomed at this time, yet uninvited visits and telephone calls on those already known are effective. Random canvassing is considered overdone.

Proprietors of beauty parlors, restaurants and retail stores of sundry sorts do not appear reluctant to discuss the merits of air conditioning and its apparatus. The reasons are two-fold: first, because the prospects have insufficient information and they wish to know the full story; and, second, results thus far secured in conditioned shops are good enough to have awakened the interest of those who have no conditioning. Before canvassing mercantile establishments, it is recommended by one firm that salesmen familiarize themselves with the special benefits likely to accrue to each given class of business. This permits solicitors to discuss conditioning intelligently.

Since personal contacts are important in finding good modernizing leads, common sense dictates keeping in close touch with the offices of architects, engineers, real estate operators and building owners and financial institutions known to have secured title to a large number of buildings by foreclosure. Change in ownership usually signifies desire to modernize to make rentable buildings pay dividends. Watching the real estate columns of "the dailies" for leads usually pays, and should be carefully done.

One contractor handles this idea a little differently in that all of his salesmen call on likely prospects in their territories prepared to discuss modernizing of any sort, including the roofing, plumbing, and other work having no connection with heating. Then having gained their prospects' confidence, they branch off into heating and air conditioning and before leaving the premises they have made a heating survey. Full information on equipment already in use and the results of interviews are reported on special forms and filed for future use. If the salesmen obtain requests for proposals these are prepared and tendered personally.

Commercial Modernizing Loan Bill Being Studied by Congress

with prospects bright for early passage; FHA has insured nearly 130,000 loans; Government activities expected to improve basic conditions

UP to April 12 the Federal Housing Administration had insured loans by financial institutions on modernizing work amounting to $53,969,065, an increase of $2,063,572 for the week. The total number of credit advances up to that date numbered 128,481.

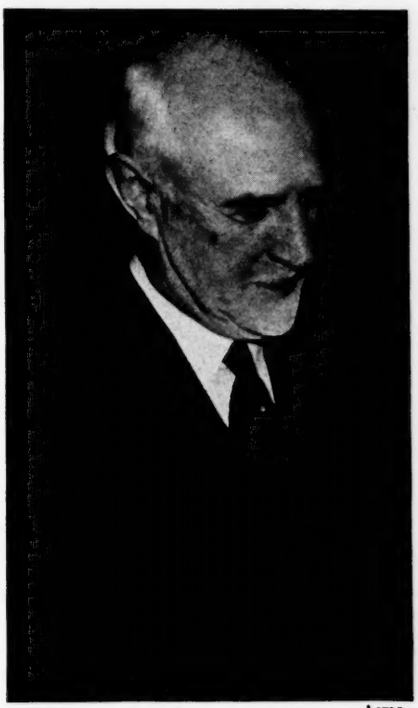
With the coming of spring it is expected that the modernizing drive which has been sustained at about the same rate for the last month will take on new life. In addition, the bill providing for increasing the amount of loans up to $50,000 (from $2,000) so as to enable the insuring of loans to commercial firms has been passed by both the House and the Senate, but in slightly different form. The bill is now in the hands of a conferring committee so as to iron out the differences between the two bills. It is believed that the revised bill will be passed and approved shortly.

On April 4 Federal Housing Administrator James A. Moffett[1] announced formal approval of the insurance of a mortgage loan of $5.5 million on an $8 million project in Brooklyn. Joseph P. Day, one of the most prominent realtors in the country and former president of the New York Realty Board, is sponsoring the corporation. Similarly connected with the enterprise is Andrew J. Eken, of Starrett Brothers and Eken, internationally known builders. The project is named the Brooklyn Beach Gardens Apartments, Inc. The New York Life Insurance Company has accepted the loan.

The property on which the development is projected has approximately 2,000 ft. of water frontage overlooking lower New York Bay, and the same frontage on Cropsey Avenue. It immediately adjoins Bensonhurst Park on the East.

This operation consists of a group of eight apartment buildings, each six stories high, with 5000 rooms located on Cropsey Ave., Brooklyn. and fronting on Gravesend Bay. It has 13 acres of ground now and will have 38 additional acres of made ground along the waterfront put in as part of the project.

[1]Who began a three months' furlough recently, leaving Stewart McDonald in charge.



Acme

John H. Fahey, chairman, Federal Home Loan Bank Board and chairman of the board of directors, Federal Home Owners Loan Corporation.

Each building will be of fireproof construction with automatic elevators, incinerators, radio outlets, dryers, electric refrigeration, and other modern facilities. About 75% of the apartments will be three or four rooms each, while the rest will range from two to six rooms. The ground will have supervised gateways as a special protection to children and there will be playgrounds also.

Preliminary approval was given late in February by Administrator Moffett for a low-cost housing project near Washington, D. C., to cost approximately $1.1 million. This will consist of six groups of two-story apartments including 276 individual dwelling units, all to be heated by a central oil-burning system. H. A. Warwick of Washington is architect for the project.

Subsistence Homesteads

Subsistence homesteads are still being approved and developed. Work is now under way on the construction of 60 houses in Birmingham which will be heated by oil-fired room units. Early in March construction was ordered on a project of 25 houses in Phoenix, Ariz., which will be heated by fireplaces. Forty-four homesteads at Austin, Minn., were provided for late in February, to be heated by warm-air systems. Fifty more for Granger, Ia., were approved, with the plans calling for stoves, but the possibility that warm air might be installed. In El Monte, Calif., 100 houses will be located, heated by electric heaters. On March 15 establishment of a subsistence homestead community in Denver was announced to cost $365,000, the homes to be heated by warm-air systems. About the same time approval of a project for 100 negro families at Newport News, Va., was given by Secretary Ickes. Plans to accommodate 200 needle trade workers and their families in the so-called Jersey Homesteads, located near Hightstown, N. J., have been approved.

Improving Basic Conditions

It is generally agreed that conditions in the (new) building industry, including heating, will have little chance of improving until the mortgage situation is cleared up. Therefore, it is of interest to note that revision of American home mortgage practices, with the purpose of making loans safer for the lender and more economical for the borrower, is making steady progress under the four agencies administered by the Federal Home Loan Bank Board.

This is being accomplished by rapid substitution of the long-term amortized loan, payable monthly in small amounts, to replace the short-term lump sum maturity loan, which has led to difficulty and widespread default during the past few years. The same amortization principle underlies the loans insured by FHA under Title II of the Housing Act.

The Federal Home Loan Bank System was established in 1932 to provide unlimited reserve credit for private thrift institutions which specialize in long-term financing. Up to March 1, it had advanced to members a total of $131,888,035.

When it was found necessary in 1933 for the Government as a relief measure to lend directly to distressed individual mortgagors, the Home Owners Loan Corporation was authorized by Congress to make amortized loans on a 15-year basis. The required monthly installment of $7.91 per $1,000 of loan, covering both principal and interest, pays off the entire mortgage within that period.

Following President Roosevelt's announcement January 29, instructing the Home Owners Loan Corporation to place before the Banking and Currency Committee of Congress its recommendation for extending the Corporation's borrowing power for home loan relief, and anticipating early Congressional action increasing its resources, the Board on February 2 authorized immediate resumption of normal procedure by its State and District offices in handling all loan applications which had been suspended by its order of November 15. This move expedites the final decision as to the eligibility of more than 350,000 applications which have been held in suspense.

Congress broke an all-time record when it agreed April 12 to raise the Home Owners' Loan Corporation bond issue authority to a grand total of $4,750,000,000.

The amount provided in the HOLC bill as it passed the House March 12 and the Senate April 12 is the largest bond issue authorization ever made to any one unit of the Government.

When the Home Owners Loan Corporation began lending, with the power to loan up to 80% of its own valuation of the properties, appraisals presented one of its greatest single problems. The Corporation was under obligation, first, to the Government as owner of the Corporation, second, to the homeowner in distress, and third, to the real estate market.

This condition required the establishment of sane, permanent values higher than knock-down depression prices, yet uninfluenced by runaway boom-time figures. There was the opportunity to eliminate for the future the wide swings that have characterized home real estate prices. There was the urgent necessity to build up a competent nation-wide appraisal personnel.

Around a nucleus consisting of the membership of the American Institute of Real Estate Appraisers, the Corporation, from the ranks of the real estate business, has trained and developed a staff of appraisers which, at its peak, numbered several thousand, most of whom were independent fee appraisers. A group of regional appraisers is maintained in the field investigating appraisal personnel, making spot checks, and reviewing valuations.

Values are determined from three factors, first, present market value, second, replacement value minus depreciation and, third, capitalization of average annual rentals over the past 10 years. The two latter elements insure appraisals materially above the depression market prices.

Some 700 Federal Savings and Loan Associations authorized by Congress in 1933 are now operating in 43 states, either as new thrift and home-financing institutions or converted building and loan associations formerly under state charter. Loans by Federal Savings and Loan Associations are amortized over periods from 5 to 20 years.

An opportunity for building and loan associations to encourage new investment in their shares, and thus expand their loaning facilities, is provided by means of insurance of share accounts available to qualified institutions through the Federal Savings and Loan Insurance Corporation, established in June, 1934. As of February 1, 1935, 553 associations had been insured, representing total assets of approximately $176 million held by some 230,000 people of small or moderate means whose savings are now protected up to $5,000 for each individual.

Renting Improves

A material improvement in apartment and private house occupancy from one year ago is shown in the survey of rental conditions recently completed by the National Association of Real Estate Boards. The results also showed that in many sections of the country apartment space was being rented at a more rapid rate than single-family houses.

The reports from Chicago and Detroit revealed that for the first time during the recovery period, apartment occupancy is higher than that of single-family dwellings. In Detroit a vacancy of only 2.5% was reported in apartments and 4.5% in single-family houses. In Chicago the apartment vacancy indicated 6.47% and 10.88% in single-family homes.

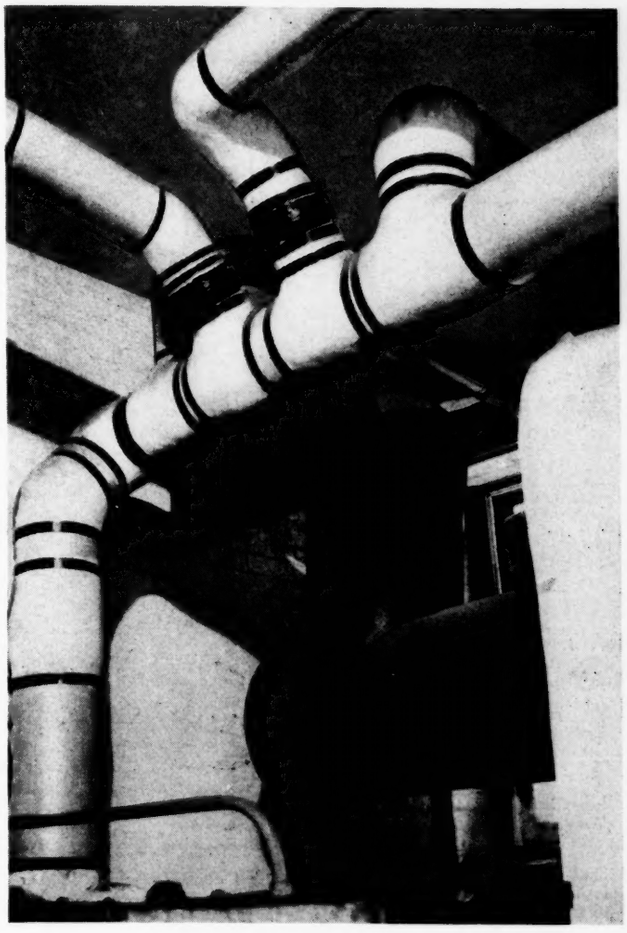
An occupancy of 99% of all types of residential structures was reported from Madison, Wis. In Indianapolis a total vacancy of 9,027 units was found, including office buildings, stores, apartments, and residences. This represented a decrease in vacancies since 1932 of 4,950 units plus an estimated 3,000 housing units torn down since that date and not replaced. Cincinnati reported apartment vacancies as 4.8%, as against 18% at this time in 1933. Kansas City showed a total residential vacancy of 9.3%. In San Diego the residential vacancy was 2.27% as contrasted with the real property inventory last year which gave a residential vacancy of 9.9%.

Modernizing Reduces Vacancies from 14 to 3 in Low Rent Apartment

MULTIPLE-FAMILY low rent apartment dwellings in large cities are undergoing modernization at an accelerated pace as owners learn from their neighbors that the cost of central heating as stove replacement usually pays for the investment in one or two heating seasons.

A typical instance of such an installation is on New York's lower East Side, the work having been completed by the Universal Heating Company, of that city. This is but one of many similar jobs handled by this contractor, who has come to be favorably known as a modernization specialist.

The building is of six stories and divided into an equal number of four-room and three-room apartments, the total number of apartments being 34. In the front on the street floor are three stores. Formerly the building, which is about 10 years old, was heated by individually-owned coal stoves, although the landlord furnished hot water from a coal-burning tank heater.



"Aluminum painted pipe covering with black band gives finished appearance to piping job."

The fact that the building had no central heating, coupled with the fact that modernization had already been effected in a few other similar residential buildings in the neighborhood, is held to be the chief cause of numerous complaints, tenants threatening to move and carrying out the threat in 14 instances. The vacancy ratio of 41% gave the owners some concern. They recalled the previous solicitation of the Universal Heating Company and decided to invest in modernizing to regain their tenants and a fair return on their investment in the property.

In studying the building one of the first points that impressed the Miller brothers, owners of the Universal Heating Company, was that no chimney tight enough and large enough to provide adequate draft for a large heating boiler existed, so that the contractor had to figure on furnishing an 80-ft. brick chimney lined with 18-in. round clay pipe.

Those familiar with chimney additions of this sort recognize the difficulty of making a change of this sort within the building. About the only opportunity as to location is outside and as near the building as possible. The new stack was placed adjacent to a rear court, or air shaft, wall.

Ordinarily boilers should be placed near the center of the building, but in modernization work one usually has to consider equipment already in place, fuel delivery, storage facilities, and such factors. Thus in the building under discussion the new cast-iron sectional boiler was placed near a rear wall, its back facing the new chimney. Fortunately the existing cement floor was thick and sound and there was plenty of head room without having to pit.

A one-pipe steam system required a minimum number of holes to cut through floors, relatively low cost for materials, and other advantages. Hence a flat-grate plant with 3,475 sq. ft. rating was furnished, and serves 75 standing radiators. Altogether there are 126 rooms in this building, but bathrooms and kitchens, 34 of each, are heated by bare 2-in. risers that pass through them.

In this neighborhood, landlords are partial to low-cost buckwheat coal. The new chimney permits the use of rice, which retails at about $6 per ton less than stove coal in this area. In some other instances the contractor has furnished magazine-feed boilers and mechanical stokers, both of which permit the use of low-cost coal without a separate electric blower. Here and there one finds owners adding blowers to existing boilers to enable the use of buckwheat.

Many owners devote no attention to basement betterment in connection with heating modernization, while others make striking changes, such as redesigning trunk and storage rooms. In this tenement house project the contractor assisted in whitewashing the

boiler room walls, building suitable coal bins and like improvements so that appearances might correspond favorably with the attractiveness of the new plant.

Both appearance and economy were improved in this case through the application of air-cell insulation to pipes and thick covering for the boiler. The latter was whitewashed and the pipe covering was painted aluminum finish. The bands that hold the insulation in place were painted black. The care taken in such details serves the contractor well in pleasing the owners and as a show place for other prospects.

The risers, 18 in number, are 2-in. and most of them extend to the top floor. In a few instances risers do not run all the way to the top floor but are capped at points where obstructions prevent their further course. In the toilets of the stores, risers are carried through the ceilings, then capped and air valves installed at the terminals.

This contractor emphasizes the virtue of doing as much of the fitting as possible in one's shop, for usually both headroom and space available for fitting on location are meager. At the same time precision in fitting is desirable to prevent cutting additional holes, making larger apertures, overcoming tenants' objections to noise and dirt, and to shorten time workmen are required to be within occupied apartments. Haphazard fitting also increases the contractor's refinishing cost and may cause complaints from the tenants.

The human factor is another problem incidental to work performance. When tenants are behind in their rent, have been pressed by owners, and have acquired a grudge in consequence, they frequently make things difficult for the contractor. In some instances tenants in this class of building have been known to play sick, go to bed, and decline entrance to workmen. In other cases people work nights and sleep days, hence do not wish to be disturbed by fitters. These factors must be taken into consideration in estimating.

It is interesting, also, in connection with low-cost tenement modernization, that some tenants actually prefer their stoves, this applying especially when the addition of central heating means increase in rents.

Following completion of the modernization, rent increases were placed in effect and the agents rented 11 of the 14 vacancies. The owners advertise by a large sign furnished by the contractor that steam heat has been installed. Inasmuch as heating was practically the sole improvement made it is agreed that the heating was the direct cause of the additional occupancy cited.

Counting the sums paid annually by the 11 new tenants and the increased amounts of rentals, the earning power of the modernization is at least $3,000 in excess of the operating cost.

Method Used by a Bank Which Approves 90% of Its Modernizing Loan Applications

IN connection with making loans under the FHA modernizing campaign, one of the most successful banks in the country has been the Cleveland Trust Company, which has approved in excess of $200,000 of modernizing loans. Ninety percent of the qualified applications for such loans are approved by this bank.

Inasmuch as the cooperation of the local bank is of the utmost importance to the contractor, engineer, builder, and architect, the method used by this institution to encourage such loans is noteworthy.[1] The bank has set up a separate department to handle FHA insured loans and branch managers have been personally instructed on the operation of the entire plan.

A description of the Cleveland Trust Company's procedure, by I. I. Sperling, assistant vice-president of the bank, appeared in the March issue of the *Bankers Monthly*, and the following is quoted from this article:

The applicant furnishes us with a receipted tax bill (or evidence that the taxes are being paid) and a property owner's credit statement in addition to the formal application.

We make inquiry of the applicant's employer on the following points—is his work satisfactory; how long has he been employed; what is the prospect of continued steady employment; what is his annual salary? To assure a clear appreciation by the employer of our relations with the applicant, the following sentence is included in the questionnaire: "Please be assured that our inquiry is motivated by our desire to help the applicant if possible and that your information will be held in strict confidence." A questionnaire is also sent to the holder of any existing mortgage, covering these points: what is the amount of the indebtedness; what is the manner of repayment; what is the amount of required payments?

Sometimes the credit references are also checked.

Our loan committee views each of these applications as an individual case. All of the facts are considered and if at all possible, the loan is granted. Sometimes in border-line cases, we require a mortgage deed, as has been pointed out, in addition to the note.

In addition to the usual stipulations of our regular note form, our FHA note carries the following statement: "In event of any default in the payment of any installment when the same becomes due, and any such default continues for a period of more than fifteen (15) days, then the undersigned shall be liable to the holder hereof for a 'late charge' of five cents (5 cents) per each dollar of each such defaulted installment to cover the extra expense involved in following up and handling delinquent payments."

The funds of an approved loan are available as soon as the loan is granted and the necessary papers signed. We, however, supervise the disbursement by requiring bills to be presented to us.

[1]The reader may be interested in calling his local bank's attention to this article, as an argument in obtaining its cooperation with the FHA plan.

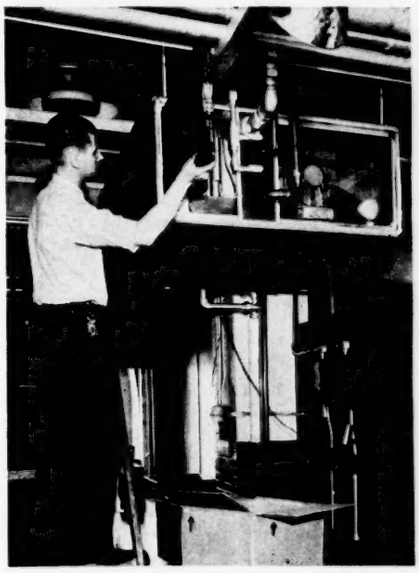
Air Conditioners Require Spring Service

AIR conditioning dealers should give proper attention to spring servicing of the equipment installed in past seasons, according to L. G. Huggins, commercial engineer, air conditioning department, Westinghouse Electric & Manufacturing Company. The cooling and refrigerating part of many of these systems has been shut down during the winter and should be put in proper condition for the coming summer's work. If the refrigerating equipment received proper service when it was shut down last fall, spring servicing will be simplified as the parts of the system not used for winter air conditioning were properly protected during the winter.

The following instructions for spring servicing of air conditioning equipment cover equipment which was shut down and disconnected for the winter period and also for servicing of systems which were merely allowed to stand without attention after the cooling season was completed last fall. Therefore, all items will not apply to all jobs.

AIR CONDITIONING UNIT—Before the equipment is started up, it should be carefully checked to make sure that it is in proper condition to start. The following operations should be performed on the air conditioning units: 1. Remove filters and either replace with new filters or if they are the cleanable type, clean and recondition them. 2. Clean heating and cooling coil surfaces using water and either a stiff wire brush or a flexible metal bristle brush. Most of the dirt collected on the heat transfer surfaces will be found on the air inlet side of these coils. 3. Clean and flush out the drip pan and drain connection to the unit. Make certain that drain pipes are free of all obstructions and that any traps in the drain lines are clean. 4. Clean and lubricate fan motors. If motors are of the commutator type, clean the commutators and brushes. Replace brushes if necessary with parts obtained from the manufacturer. 5. Check fan operation. Make sure that the air delivery is approximately correct. 6. Check noises. Operate the fans and if there is any unusual noise, this should be eliminated. Also remove any rattles or mechanical noises which may show up. 7. Check fresh air intake dampers, ducts and connections. Clean if necessary and make sure that dampers work properly. 8. Set outlet grilles properly for summer operation. The setting of outlet grilles or louvers often should be different for winter and summer to secure best results. This point should be rechecked after the system is running and supplying cool air.

CONDENSING UNIT—After the above operations have been performed on the air conditioning units, the condensing unit should be prepared for operation. 1. Remove protective cover of muslin or paper placed over the unit last fall. The unit should be cleaned by wiping it off with a rag moistened in gasoline or other solvent to remove the protective coating of oil applied to metal parts. The unit should then be wiped with a slightly oily rag so that some oil film is left on it. 2. Clean the condenser of air cooled machines thoroughly, using a stiff brush or wire brush similar to that used for cleaning the evaporators. Make sure that any air ducts connected to this condenser are unobstructed. 3. Oil motor bearings in accordance with the motor manufacturer's instructions. Any other points requiring lubrication, except the oil in the compressor crankcase, should also be cared for. 4. Clean condenser water line strainer and water regulating valve. If the valve seat in the water regulating valve looks worn, it should be replaced with a new seat obtained from the manufacturer of the valve. Do not use makeshift parts as they only encourage trouble for your customer and for yourself. Check the water regulating valve to make sure that the valve stem has not stuck in the packing. Repack this stem if necessary. 5. Reconnect water inlet and outlet piping to condenser if this was removed last fall. Open water shut-off valve and remove key or handle from valve to prevent water being accidentally shut off during the summer. 6. Purge air and non-condensable vapors from the condenser or liquid receiver. Test purge valve cap after it is replaced. 7. Check quantity of oil in compressor crankcase. If the level appears low at this time, however, do not add oil as it may have been pumped into the condenser when unit was "pumped down" last fall. 8. Examine line starter contacts and either clean up contacts with a file or if they are burned appreciably, install new contacts obtained from starter manufacturer. 9. Replace fuses in control circuit only and try control equipment. Make and break contact at the room thermostat and the hand control switch. Be sure the motor starter is operating in response to the various control devices. 10. Replace power circuit fuses, start condensing unit momentarily and check direction of rotation of compressor. 11. Examine and clean refrigerant line strainer on the condensing unit. 12. Install pressure gauges on the "high side" and "suction side" of the condensing unit. 13. Check flow. If the condensing unit is not provided with a permanent refrigerant sight flow indicator, install a service sight flow indicator for test purposes. In installing the sight flow gauge, be sure to purge air out of the piping with refrigerant while it is being installed. 14. Open the liquid outlet valve on the liquid receiver tank and allow sufficient refrigerant to escape into the piping of the system to provide about 25 lb. pressure in the piping. Close this valve and carefully check all joints and connections on the condensing unit, on the refrigerant piping and on the air conditioning units. 15. If test indicates piping is tight and free from leaks, open the liquid line valve completely, allowing the refrigerant stored in the liquid receiver to escape into the system. Open the valve between the compressor and condenser and also the suction line valve. If pressure gauges are installed on gauge ports on these valves, be sure the gauge ports are not closed when the valves are opened. 16. All gauges should now read the equalized pressure of the system, from 60 to 80 lb., depending upon the room temperature. Start the air conditioning unit and the condensing unit and allow them to operate in a normal manner from 10 to 15 min. or until the system becomes stabilized in operation. 17. During this initial running period, watch the compressor oil level carefully. If this level does not return to normal after a few minutes, investigate and add oil recommended by the manufacturer if required. 18. Observe liquid flow indicator. If a solid stream of refrigerant is not secured, investigate and add refrigerant by the method recommended by the manufacturer of the condensing unit until a solid stream of refrigerant is secured. Then add the recommended surplus amount of refrigerant. Weigh and record the amount of refrigerant added. 19. With system in operation, examine all valves and strainers in the liquid line. If these are restricted, there will be a temperature change at the valve which can be read-



Replacing a throwaway-type filter

ily detected by an experienced service man. If such restrictions are found, clean the questionable strainer or make sure that the valve is open to give unrestricted flow of refrigerant. 20. Put a thermometer on the evaporator outlet at the point where the expansion valve bulb is attached to the suction line. Measure the temperature at this point and compare this with the temperature corresponding to the suction pressure. This should indicate approximately 10° superheat. If not, carefully adjust the expansion valve 1/6 of a turn at a time until the proper reading is obtained. 21. Check operation and setting of water valve. If the head pressure is not that desired, adjust the water regulating valve until the proper head pressure is obtained. After this adjustment is made, stop the condensing unit and make sure that the water regulating valve will shut tightly, completely stopping the flow of water. This will probably take from ½ min. to 2 min. after the condensing unit is shut down before the water is turned off entirely. 22. Check operation of the high-pressure cut-out by cutting off the water to the unit and recording the head pressure at which the cut-out stops the machine. If the machine is not stopped at the recommended head pressure the high-pressure cut-out should be properly adjusted to stop the machine at this point. This high-pressure cut-out is a safety device and its setting is important. 23. With the system operating normally, cooling properly and a solid stream of refrigerant being obtained, remove the sight flow indicator, if one was installed specially for the test. In putting back the regular piping, the same precautions regarding purging air out of the pipes should be followed as outlined under (13). 24. After removing sight gauge, restart the condensing unit and with the system running normally, again check all connections and joints. 25. Remove all caution tags put on the machine for winter use. Put a tag on the electric controller, giving the dealer's telephone number for day and night service calls. This tag should also caution the owner not to try to make adjustments on the machines. If the apparatus was built by a reliable manufacturer and you have done your service work carefully and thoroughly, there should be little occasion for the customer to use this emergency telephone number. In performing this service work, the service man should continually keep in mind that he should do his work in such a manner that there will be no occasion for a service call until the owner is ready to shut down next fall.

Air conditioning dealers should solicit owners of equipment they have installed in past years for an order to check over their cooling equipment and put it in good operating condition. If this procedure is followed before hot weather actually starts, it will eliminate emergency calls from perspiring customers on the first hot day of the season informing you that they have tried to start their cooling system and they will not operate properly. By getting the apparatus properly adjusted for summer operation before it is actually needed, you render a real service to your customer. This service will be appreciated and may help close some of your present important negotiations.

NRA to Require Minimum Contribution in Future Codes

THERE were few developments in NRA codes for the industry during the past month. A few rules relative to specific branches of the industry were made and some general provisions were passed which affect some of the details of operation of the codes.

Among the latter was a ruling made April 12 emphasizing the distinction between mandatory and permissive cost formulas or cost systems. Those that are mandatory are used in connection with selling below cost provisions in codes. These are integral parts of codes when approved and are subject to enforcement.

A similar ruling by W. A. Harriman, NRA administrative officer, dated April 5, outlined the procedure to be followed by code authorities in the collection of past due code contributions. On April 12 NRA announced new rules regarding contributions from industry to the costs of code administration designed to relieve small firms of an inequitable burden, lessen multiple assessments, simplify collections, and permit the rate of contribution to be reduced at any time.

One administrative order requires that budgets and bases of contribution submitted hereafter must contain "recommendations for reasonable classifications designed to eliminate nuisance contributions" (those very small in amount) "and for exemptions designed to avoid inequitable contributions on articles which are not marketed *per se*."

This order is designed to provide a minimum size of firm or amount of business, measured in sales volume, number of employes, or some other equitable criterion, below which no contribution will be asked, or a basic initial exemption somewhat similar to that provided in the income tax law. It is also intended to prevent multiple assessments on a product which is handled for processing, and sold as a part of some other product.

With the approval of Chapter XXIV of the construction industry's code, and relating to the cork insulation contractors' division, the total of approved chapters of this code is now 22. The sequence of chapters from I to XXIV is broken only by the architects' proposed Chapter XVIII and the professional engineers' proposed Chapter XIX, neither of which has been completed.

The issue raised at the hearing held in Washington on February 28 as to the representative character of the sponsors of the code for the pump manufacturing industry is still before NRA for decision. The present status of the controversy is that report and recommendations have been made by the deputy administrator in charge of this code, to the National Industrial Recovery Board, where the matter is held for review and final disposition.

The extensive amendment to the oil burner code with a tentative plan for a cost system for the industry has been considerably revised. The cost accounting amendment has been withdrawn at the request of the industry's code authority, and a new amendment submitted following a conference with NRA. These amendments which have been assented to by the code authority were submitted to the NRA Board by Deputy Administrator Barton W. Murray on April 15 for the board's consideration and final action.

Approval has been given to the membership of the code authority for the unit heater and/or unit ventilator manufacturing industry as follows:

G. E. Otis, Herman Nelson Corp.; J. F. G. Miller, B. F. Sturtevant Co.; A. G. Dixon, Modine Manufacturing Co.; and R. J. Tenkonohy, Airtherm Mfg. Co.

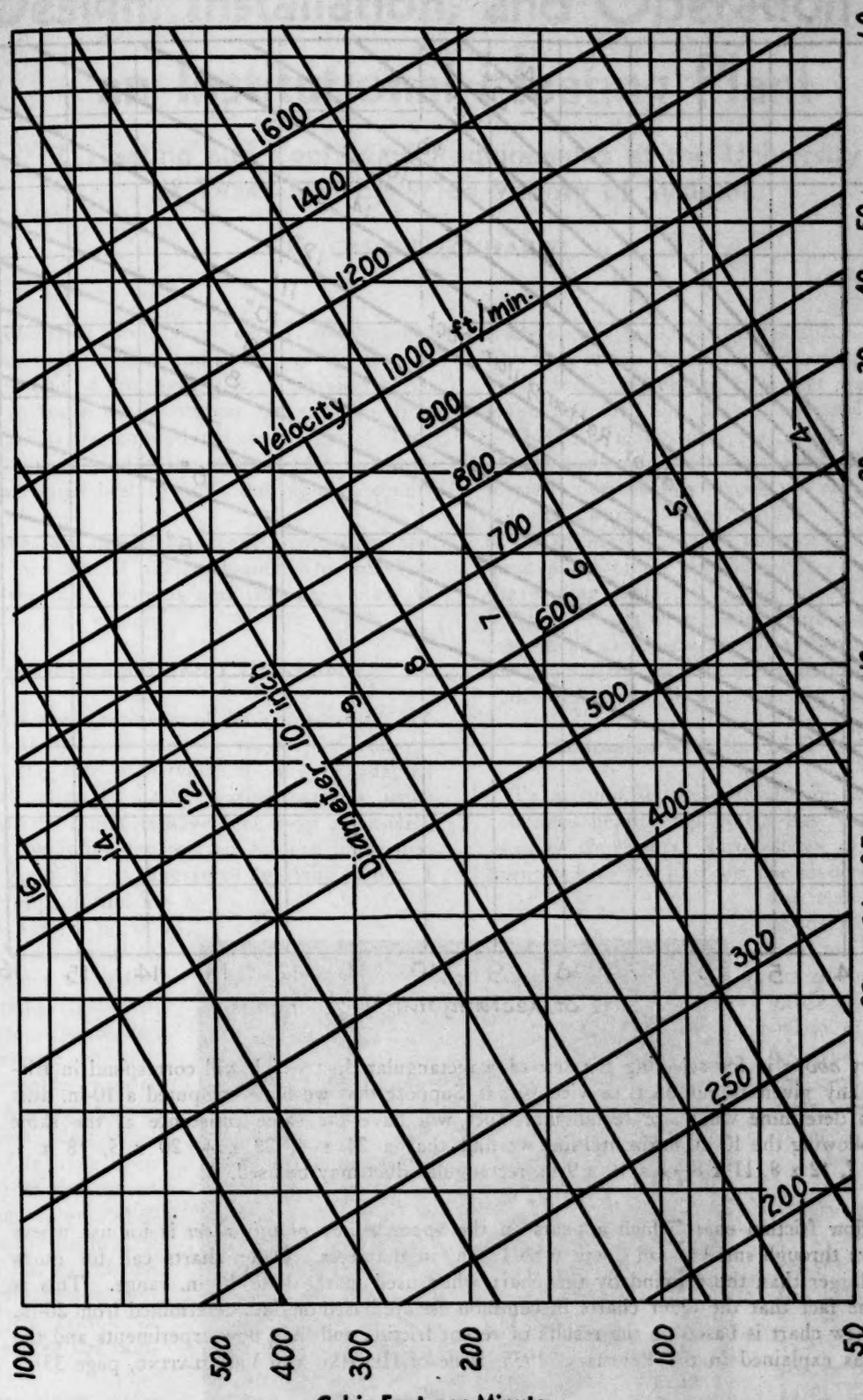
In three administrative orders, issued April 4, NRA has exempted for six months members of the heating, piping and air conditioning contractors division in Worcester, Middlesex, and Franklin Counties, Mass., from the provisions of Article II, Section 1 (a) of Chapter XVI of the Construction Code. These respective provisions establish minimum skilled wage rates.

On April 24, the code authority for the heating, piping and air conditioning contractors division of the construction industry has applied for approval of its $307,500 proposed budget, and the basis of contribution, for the period from June 16, 1935, to June 15, 1936.

The proposed rate of assessment would be one fourth of one percent of all contracts of $250 or more on total volume of estimated business. The estimated volume of business for 1934 is $123 million.

ESTIMATING DUCTWORK

Friction Chart for Small Ducts



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(See other side for explanation.)

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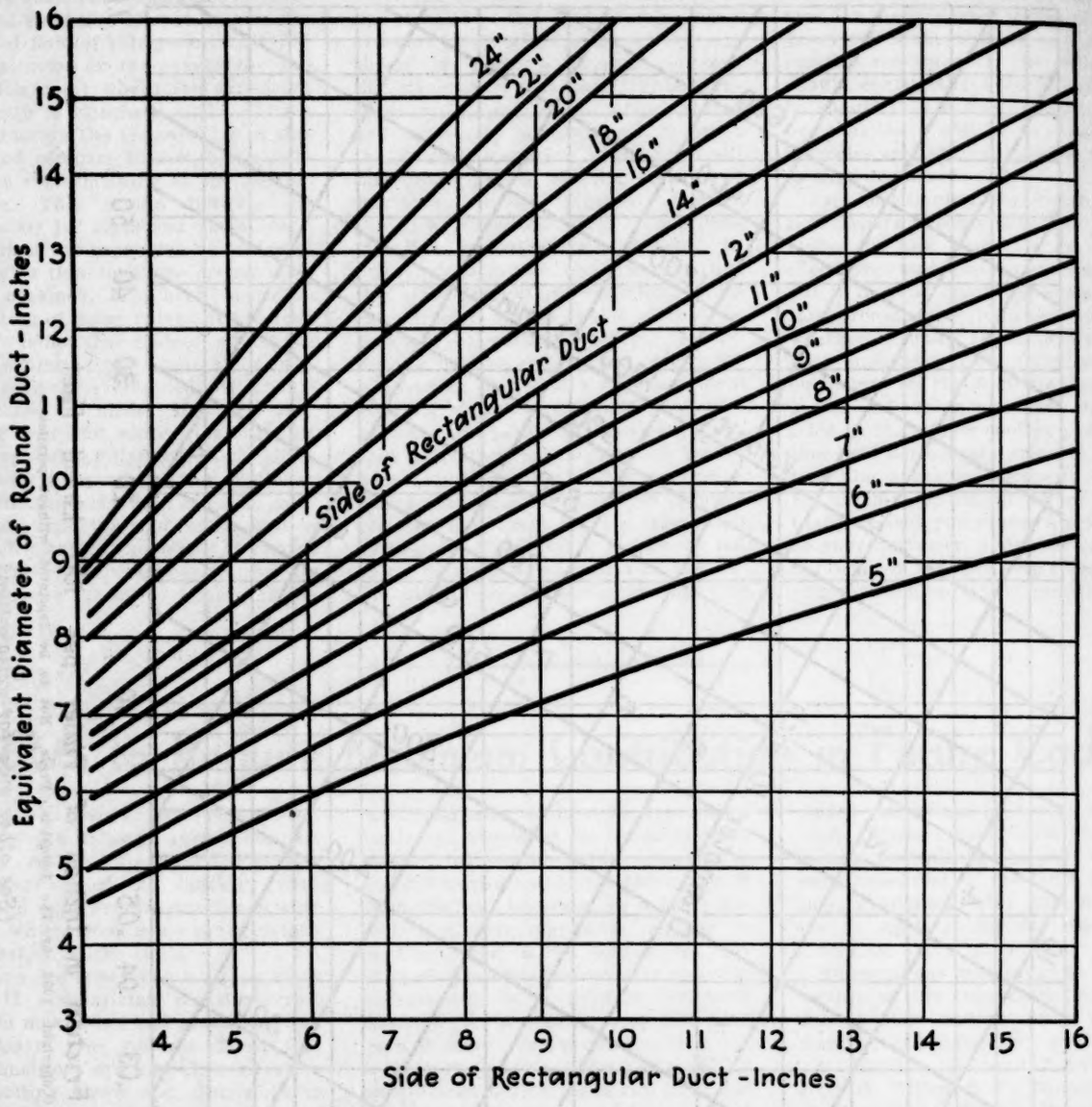
H. & V.'s REFERENCE DATA—53

ESTIMATING DUCTWORK

Conversion Chart for Round and Rectangular Ducts



The chart *above* is for selecting the size of a rectangular duct which will correspond in friction loss to any given round duct, or vice versa. Suppose that we have computed a 10-in. duct and want to determine what size rectangular duct will have the same resistance at the same capacity. Following the 10-in. horizontal line we find that a 24 x 4, 22 x 4, 20 x 5, 18 x 5, 16 x 6, 14 x 7, 12 x 8, 11 x 8, or a 10 x 9 in. rectangular duct may be used.

The air flow friction chart which appears on the *opposite side of this sheet* is for use where 130° air flows through small round ducts, 6 to 12 in. in diameter. Older charts call for ducts about 15% larger than those found by this chart when used in the 6 to 12 in. range. This is caused by the fact that the older charts in common use are based on data determined from 20-in. ducts. The new chart is based on the results of recent friction and fluid flow experiments and the derivation was explained in the February, 1935, issue of HEATING AND VENTILATING, page 33.

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Design, Installation, and Operation of an Institutional Heating Plant

2. Heating and Ventilating Requirements at the University of Texas Met by Wide Variety of Systems

By CARL J. ECKHARDT, Jr.†

THE University of Texas enrolls over 11,500 students per year. Since the number and variety of the courses of instruction offered are great, a large physical plant is required to house the institution. In each building specific conditions are required and the designs of heating systems incorporated in the plans of such buildings are those calculated best to fulfill the required conditions.

All buildings are heated by steam provided by the institution's two central heating plants. One plant is located on the main campus and the other plant is located on the little campus.

Extensive Use of Direct C.I. Radiators

Because of the durability of its construction, the simplicity with which it may be maintained and repaired, and the ease with which it may be adapted to automatic control, direct heating systems using exposed cast-iron radiators have been most extensively used in the buildings constructed by the university. Steam is supplied at pressures varying from 1 to 5 lb. per sq. in. and a vacuum of 3 to 5 in. of mercury is maintained on the return lines to establish a rapid circulation when the heat is turned on and to scavenge air and non-condensable vapors while the heating system is in operation. Most satisfactory results have been obtained from the use of tubular hot water radiators having the steam connection at the top of one end and the return connection at the bottom of the other end of the radiator.

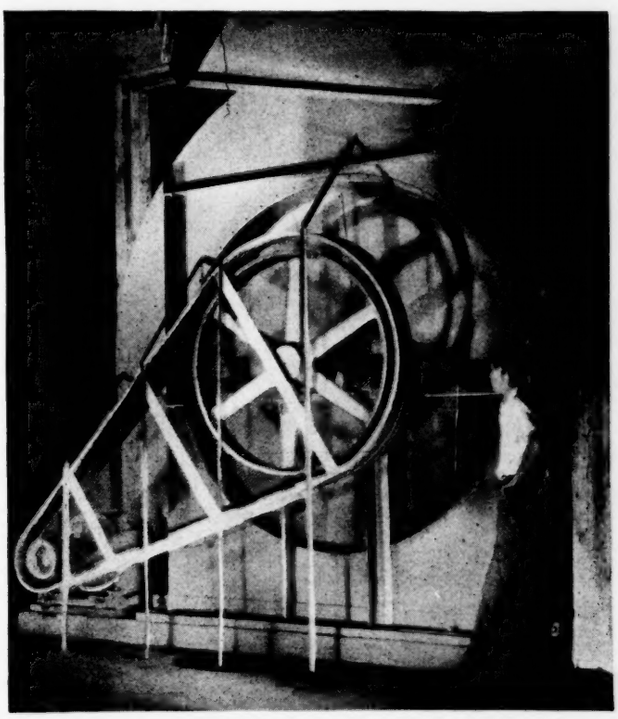
In some places space limitations have made the use of tubular radiators difficult. In such instances wall radiators, which generally occupy considerably less space, have been used. This type of equipment has, moreover, been extensively used on the ceilings of basement rooms in order to maintain return lines as high as possible.

There are many instances in which the exposure of heating equipment is objectionable. This objection was formerly overcome by placing the radiators within suitable enclosures having grilled openings. Enclosure of the ordinary cast-iron radiators solved the concealment phase of the problem, but a happy solution of the heating problem did not always result. In later buildings efforts were made to remedy this by selecting equipment which, if it needed to be concealed, was better adapted to establishing a natural air circulation, and which could be made readily accessible.

Concealed Radiators of Convector Type

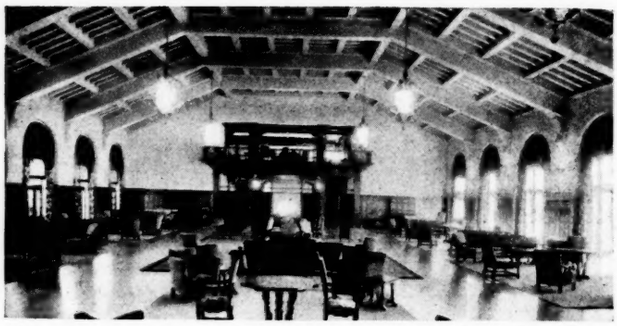
To accomplish these results in later buildings all concealed heating equipment has been selected in the form of convectors. Two classes of convectors have been used for this purpose, one involving use of a heating element consisting of copper tubes and non-ferrous metal fins. The headers are of cast iron. The other type of convector is made of cast-iron finned sections assembled with cast-iron headers into compact units. Use of both types of equipment makes possible a study of competitive characteristics which will determine the policy to be ultimately adopted for selection of convectors.

Use of direct heating systems using either radiators or convectors is necessarily limited to the field in which this type of equipment can be effectively applied. Such equipment cannot be satisfactorily applied to heat rooms having large cubic contents. The type of equip-

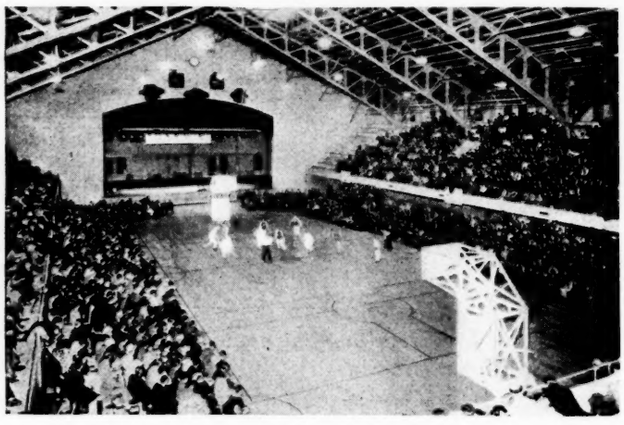


Fan of the system serving the book stacks.

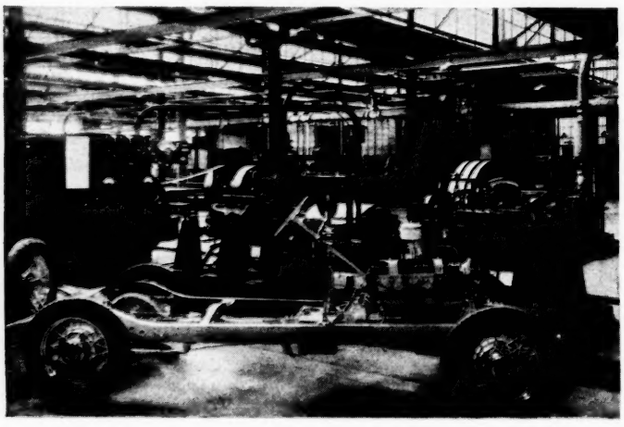
†Adjunct Professor of Mechanical Engineering, The University of Texas, Austin, Tex.



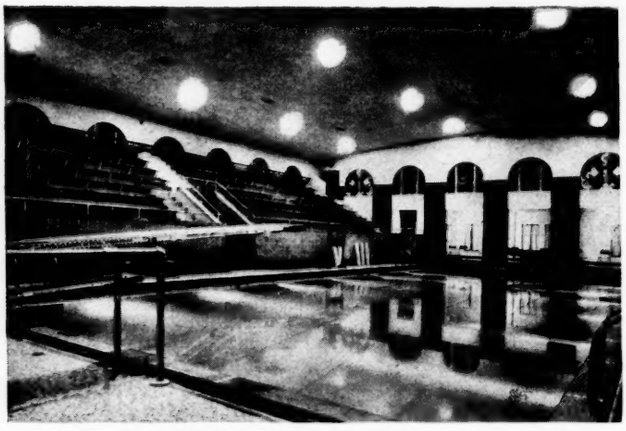
Main lounge of Union building, size and construction of which made the downward system desirable.



Auditorium of Gregory gymnasium which seats 8000 people and is heated by unit heaters.



Typical engineering laboratory with large open spaces and sawtooth roof, heated by unit heaters.



Women's swimming pool, heated by blast heaters.

ment used for such rooms generally differs widely and its selection depends largely upon the arrangement of the room and the use for which the room in question is intended.

Use of Unit Heaters

Unit heaters were applied to heat the gymnasium auditorium in order to circulate the air in this large space at a rapid rate, and to direct the heated air so as to accomplish the positive and rapid placing of the heat where it was desired. This gymnasium is used for many purposes, and the number of people attending the functions scheduled there differs widely. In this building the unit heaters are supported directly from the overhead exposed structural members and from the ceilings under the balconies.

Use of unit heaters has, furthermore, been found to be effective in large laboratories and shops where large open spaces, sawtooth type of roof construction, and the host of equipment installed make the selection of the unit heater entirely logical for the following reasons:

1. The use of unit heaters promotes a uniformity of temperature and makes possible a quick "heating up."
2. With this type of building construction the unit heater tends to reduce the temperature differential between the floor and ceiling.
3. In such laboratories the piping systems required for equipment installed are extensive and complex. The use of unit heaters reduces the number of heat-emitting units required and simplifies the piping layout.

In some cases floor-set recirculating type unit heaters of the industrial type were used.

While the unit heater circulates air in off-heating season periods, it cannot condition the air as can a large indirect system.

Blast Heaters Used in Gymnasiums

In some instances the exposure of air circulating equipment is objectionable. The women's gymnasium contains a number of large gymnasiums, a swimming pool, and shower rooms. Use of an indirect heating and ventilating system was not feasible because the layout of the building was such that the gymnasiums are widely separated on opposite sides of a large patio. No effective system of radiators could be employed. Consequently, these spaces were heated by the use of blast heaters. These are completely concealed in back of decorative grilles shown at the rear of the room and above the ceilings. In a gymnasium the circulation of air when heat is not needed is highly desirable, a requirement met by the blast heater.

Design of the heating systems of a number of buildings otherwise provided with direct heating systems has been somewhat complicated by the presence of a single large room which is rarely, if ever, occupied by a large number of people. The cubic content of such rooms has been too great to permit effective heating by the use of direct heating equipment. A similar condition has arisen in the case of comparatively small lecture halls which for projection purposes have been provided

with window darkening devices. The first case requires some indirect form of heating, but the size of the room does not justify a regular indirect heating system. The projection room involves one in which direct heating may be resorted to but in which some form of ventilation is essential.

Unit Ventilators

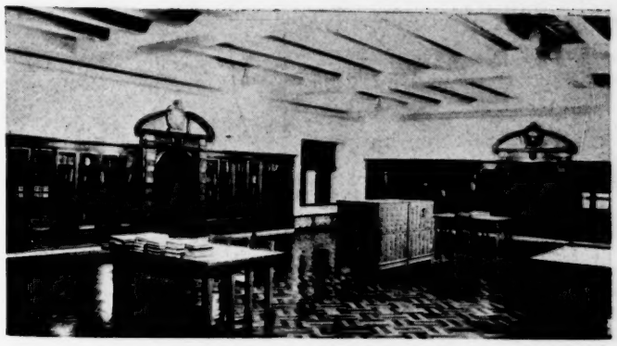
Rooms of this type are well adapted for the application of universal heating and ventilating units or unit ventilators. This type of equipment has effectively been applied to meet the requirements of both kinds of conditions just referred to. The fact that the unit ventilator is capable of circulating air in the off-heating season period makes it a highly desirable piece of equipment.

Small isolated indirect heating systems have been installed in a number of buildings which have otherwise been heated with direct heating systems in instances in which comparatively large rooms are at times occupied by a large number of students. These systems have been arranged to introduce a certain amount of partially conditioned air of which either a part or the whole may be outside air and the removal of an equivalent amount of vitiated air. These simple systems have involved the use of a suitable motor-driven fan, duct system, outside air intake with necessary dampers, heating coils and the required auxiliaries. The amounts of outside air drawn in and recirculated are determined by manual setting of dampers. Application of heat to the heating coils is controlled automatically by the temperature of the incoming recirculated air. Absence of air washers makes impossible the complete conditioning of air with this equipment. In the off-heating season period the closing of recirculated air dampers and the provision of suitable openings for the discharge of air out of the room make possible an effective ventilating system by the use of outside air only.

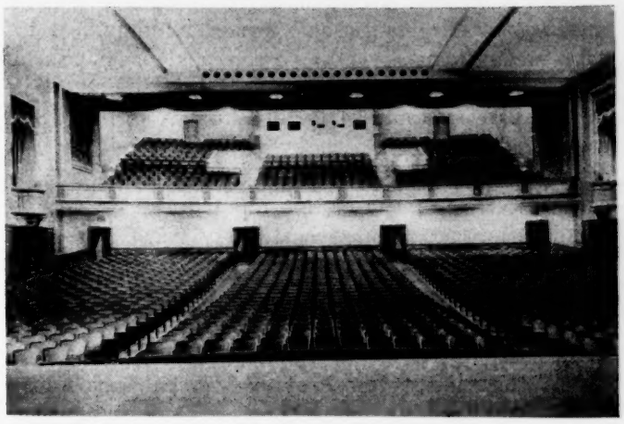
Two Classes of Indirect Systems in Use

The large heating and ventilating systems used at the university may be divided into two classes. In one class the air is washed and heated to the desired condition and then distributed throughout the building. This type of system has been applied in buildings in which a single or a few large rooms are involved. In the other class of indirect heating system the air for each room is prepared separately and the system is, therefore, capable of providing a variety of conditions for different rooms simultaneously. The latter system is obviously used in buildings heated by indirect heating systems in which the cubic content is subdivided into a few large and many small and moderate-sized rooms in which different conditions are desired.

The first type of building heating system referred to is installed in Hogg Auditorium. The size and importance of this gathering place readily justify a more complex system than that used for the lecture halls previously described. The system includes a preheater, air washer, reheater, fan, ducts, temperature and humidity control equipment, as well as dampers by means



The Garcia library, typical of the small specialized libraries not contained in the general book stacks.

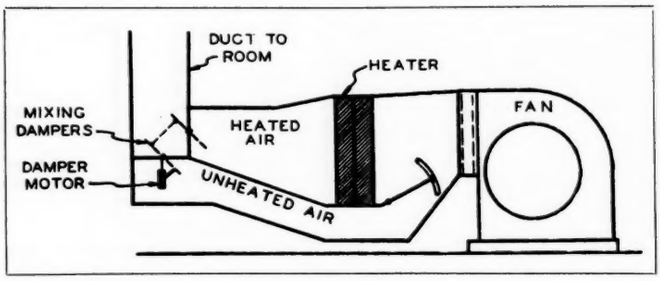


Hogg auditorium from the stage. This hall has a capacity of 1300 people and has a downward system.

The cafe or "Chuck Wagon" in the Union building which also has a downward system.

Tearoom in Home Economics building heated with concealed convectors placed under windows.

of which the relative amounts of fresh and recirculated air used may be regulated. In its present condition this system may be used for ventilating purposes only in the off-heating season period, but it is so designed that the addition of refrigerating equipment alone will convert this system into a modern and complete conditioning plant.



Diagrammatic sketch of arrangement on discharge side of the fan system serving the smaller library rooms.

Similar heating and ventilating systems have been installed in the institution's Union building. In this case two systems are used to heat and ventilate three comparatively large rooms. The Chuck Wagon, a cafe, and the cafeteria in the same building are provided with a similar system. The size and construction of the cafeteria are similar to that of the main lounge. The compact arrangement of this room precludes the possibility of using a direct heating system. The conditions required in these two rooms are, however, identical so that the same system may be used to provide the required conditions.

Special System Provided for Library

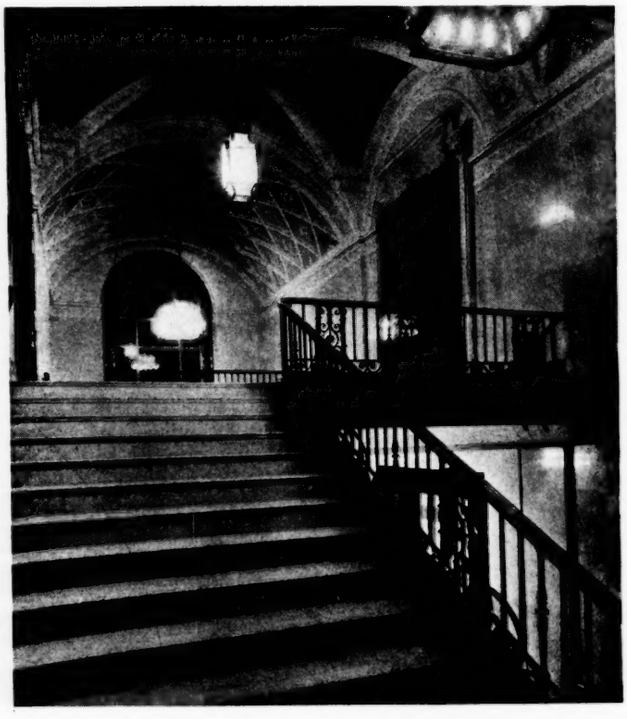
The design of a heating and ventilating system for the large new million dollar library involved problems which could not be solved by such a simple treatment. The design of the building with its large open spaces and the conditions required necessitated use of an indirect system. The building, however, contained many small rooms and offices. Conditions with regard to temperature and humidity naturally differed in different parts of the building, i.e., conditions desired in the book stacks were not identical with those required in the delivery room and other parts of the library. As a result of these circumstances six separate indirect heating and ventilating systems were installed in this building.

The number of small rooms included in the library building was large. It was necessary, therefore, that the system employed in these should be so arranged that the air for each room might be especially prepared to meet the conditions and requirements of that particular room. The preheating equipment was omitted from these systems. Outside air and recirculating air ducts enter a large common plenum. Dampers have been arranged to permit the regulation of the relative amounts of each kind of air used. All air drawn into the system passes through the air washer. The temperature of the spray water is controlled automatically by the admission of steam to an external heater or heat exchanger through which the spray water passes on its way from its circulating pump to the spray nozzles. After passing through an adequate series of eliminators, the air is drawn into the circulating fan.

An inspection of the accompanying drawing will reveal that upon leaving the fan some of the air passes through the heaters provided in the discharge duct and the remainder of the air is bypassed around these heaters. A "splitter" damper may be adjusted to proportion this separation. The duct leading to each room or each of a series of stacks in the case of the book stacks is connected to the hot and unheated sections of the discharge duct. Mixing dampers are used for the purpose of regulating the proportion of heated and unheated air entering the duct leading to each room. In this manner a great variety of conditions may, if desired, be established.

The arrangement of the dampers is such that if the room served by that damper reaches its lower temperature an intermediate acting thermostat changes the position of the mixing dampers in such a fashion as to admit more heated and less tempered air. Each damper is actuated by a compressed air motor. The compressed air is obtained from a compressor and storage tank installed in the basement of the building.

Dual operating thermostats are provided in each room so as to maintain a lower temperature at night. If the room is to be used at night, the occupant may push a button on the thermostat and thus restore the day temperature level in that room.



Stair to the main delivery room of the library, typical of the large miscellaneous open spaces in this building.

Next month the author will describe the steam distribution system through which 200 million pounds of steam are conveyed annually to the various buildings.

$450 Million Appropriated for Housing

under the provisions of the Emergency Relief Act enacted during April. In addition, a large part of the $900 million provided for loans to states and cities will be used for building

WEARY Congressional conferees sighed with relief when a complete conference agreement on the Administration's battle-scarred $4,880,000,000 works and relief bill was finally reached April 4. Ending a 10 weeks' rough route to completion, this largest appropriation measure of all time was promptly passed by Congress and approved by the President April 8. Its official title is the "Emergency Relief Appropriation Act of 1935," and its filing label is "Public Resolution No. 11—74th Congress."

The duel between Senate and House conferees over direct labor requirements ended in a draw. The last-minute compromise required that one-fourth of loans to states or localities for any specific project should be spent for labor on such projects, the President to determine the percentage of labor cost.

Senator Carter Glass, of Virginia, chairman of the Senate conferees, had contended one-third of the loans should go for labor, but he indicated the compromise will accomplish his purpose—to prevent the purchase or operation of private power and gas plants through Government loans.

Features of the Act

Where the Money is Coming From—The Act provides for an appropriation of approximately $4.88 billion to be expended at the discretion and under the direction of the President[1], such sum to be immediately available and to remain available until June 30, 1937. Funds to be provided as follows: From the U. S. Treasury, $4 billion; from savings or unexpended balances in the funds of R.F.C., $500 million; and not exceeding $380 million from such unexpended balances as the President may determine are not required for the purposes for which authorized, from a number of previously authorized appropriations including the $3.3 billion National Industrial Recovery fund, the appropriation of $950 million for emergency relief and civil works (approved February 15, 1934); the appropriation of $899,675,000 for emergency relief and civil works (approved June 19, 1934), and from various other funds named in the Act.

General Allocation of 1935 Emergency Funds. The Act, with certain exceptions and reservations, provides for the following classes of projects:

1—Highways, roads, streets, and grade crossing elimination	$800,000,000
2—Rural rehabilitation and relief	500,000,000
3—Rural electrification	100,000,000
4—Housing	450,000,000
5—Assistance for educational, professional, and clerical persons	300,000,000
6—Civilian Conservation Corps.	600,000,000
7—Loans or grants for projects of States and municipalities	900,000,000
8—Sanitation, prevention of soil erosion, prevention of stream pollution, and miscellaneous projects	350,000,000
	$4,000,000,000

In addition, an amount not to exceed 20% of the amount appropriated in the Act may be used by the President to increase any one or more of the foregoing limitations if he finds it necessary to do so in order to effectuate the purposes of the Act. Provision is made for making loans for agricultural purposes; for the administration expense of the Agricultural Adjustment Act; for disability or death compensation and benefits for persons employed by the U.S. under appropriation expenditures of the Act; for stenographic and other services, equipment, etc.

Limitations Under the Act

No part of the appropriations will be expended for munitions, warships, or military or naval material, but this restriction does not include new buildings, reconstruction of buildings, and other improvements in military or naval reservations, posts and forts.

Rivers and harbors projects, reclamation projects (except drilling of wells, etc.) and public buildings projects undertaken pursuant to the provisions of the Act will be carried out under the direction of the respective permanent Government departments or agencies now having jurisdiction of similar projects.

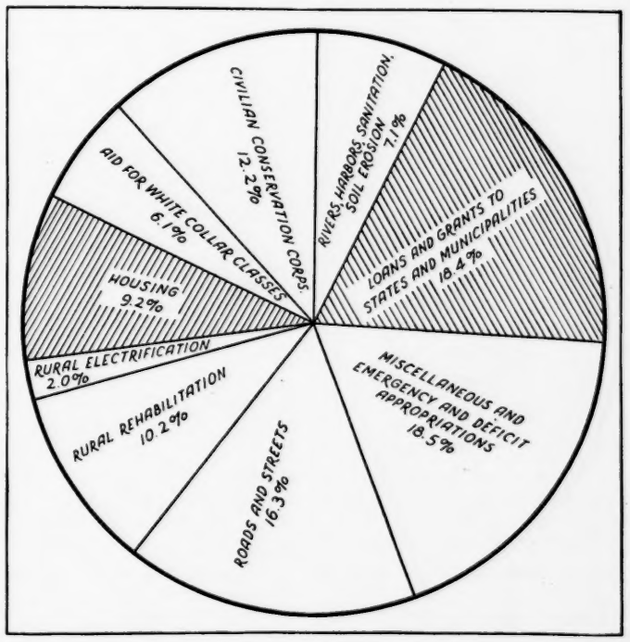
Loans or grants to states or municipalities must provide that "not less than 25% of the loan or grant, or the aggregate thereof, is to be expended for work (labor) under each particular project."

Any administrator, or other officer, or the members of any central board to have general supervision over the program receiving a salary of $5,000 or more per year from such appropriations, will be appointed by the President, *by and with* the advice and consent of the Senate.

The President will require to be paid such rates of pay for all persons engaged upon any project financed by funds appropriated by the Act, as will accomplish the purposes of the Act, and not affect adversely or otherwise tend to decrease going rates of wages paid for work of a similar nature.

The President may fix different rates of wages for various types of work on any project, which rates need not be uniform through-

(Concluded on page 60)


CIVILIAN CONSERVATION CORPS 12.2%
RIVERS HARBORS SANITATION SOIL EROSION 7.1%
AID FOR WHITE COLLAR CLASSES 6.1%
LOANS AND GRANTS TO STATES AND MUNICIPALITIES 18.4%
HOUSING 9.2%
RURAL ELECTRIFICATION 2.0%
MISCELLANEOUS AND EMERGENCY AND DEFICIT APPROPRIATIONS 18.5%
RURAL REHABILITATION 10.2%
ROADS AND STREETS 16.3%

Where the $4.88 billion Emergency Relief money will go. The building industry is directly concerned with the funds for Housing and those for loans to states and cities, much of which will be used for building.

[1]Frank C. Walker was appointed by the President on April 23 as head of the Division of Applications and Information, a division within the National Emergency Council, of which he has also been reappointed director.

EDITORIALS

NRA Extension

With June 16 only about a month off it gets more evident every day that a new enactment to take the place of the existing NIRA is going to be delayed right up to the expiration date. In the meantime code authorities and other NRA organizations are beset with doubts and questions. What may happen no one knows, and it looks as though things will get progressively more confused, at least until there is a Supreme Court decision. The situation is not helping business a bit.

All spring, hearings have gone on at Washington and there seems no end to the array of witnesses who march in and out of the hearing rooms. Every last one seems to have ideas about what should be done, and there is but little agreement. The one point on which there is a definite agreement is that most of the witnesses are loath to see the plan abandoned entirely. Nearly all admit that there are good points in it and that something ought to be salvaged.

Sentiment in our industry concerning the whole NRA situation has been impossible to determine with any accuracy. There is little doubt that many have benefited. How many have been harmed is a question. Neither does there seem to be any consensus of opinion as to what should be done. So also are we at a loss when it comes to recommendations.

We still believe that as originally put forth the idea of codification had real merits. We also feel that the ideas have been grossly mishandled. So long as there seems a chance of saving anything good we believe that we are justified like most other groups in adopting an attitude of watchful waiting.

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An Encouraging First Quarter

Figures for the first three months of the year are now generally available. They are extraordinarily encouraging on the whole. Rental rates are on the increase, vacancies are falling, mortgage money is appearing at lower interest than for years. These are all signs—not actual records—of the present volume. Reported volume of work under contract, alone among all the other indicators, did not give reason for optimism. Work contemplated, however, lined up with what the other favorable signs show. Commentators generally agree that conditions are now well set for building to go ahead. What with the amount of modernizing work expected, it is confidently predicted in an increasing number of quarters that we are to experience a gratifying increase in volume of work during the present year.

●

Air Conditioning for Health

For years a considerable number of engineers have thought that air could be so conditioned that it would have value as a tool for use by the medical profession. Any statements to this effect by engineers, however, were usually regarded with scorn by anyone connected with research or practice of medicine. Since air conditioning has been popularized researchers in various branches of medicine have shown a really surprising interest in its possibilities. Numerous experimental rooms have been equipped and studies have been initiated. These have ranged all the way from those where conditions were kept at a point intended to promote convalescence, to those wherein conditions were deliberately varied greatly from those usually thought of in comfort work. Atmospheres have been enriched in oxygen, increased in pressure, and used with temperatures in the neighborhood of 175°. Recently it was reported that high temperatures appeared to have possibilities in treating lung diseases. Progress in the human health aspects can be expected to be slow, as it should be, for no one wants to see any false moves made which will give air a setback now that we seem on the way to its extended use in treating disease and promoting good health.

●

More and Larger Loans

Extension of the Home Owners Loan activities and of the amounts available through FHA insured loans seems assured. Both acts have passed both houses of Congress.

With the authorized amount of loans under HOLC extended to nearly five billions some people see the government left holding mortgages of doubtful value to an alarming extent. There is really no reason for concluding though that these mortgages are of any less ultimate value than they would have had if they had remained in the hands of their original owners. Putting them in the possession of the government makes their holding a public risk instead of a private risk, and at the same time lessens the threat of default and foreclosure because the government has greater resources to carry the risk. As soon as there is a demand for such property or as soon as their owners are in better circumstances the risk of default will decrease. It is even possible that there may be an eventual profit from the HOLC operations. In the meantime extension of the lending operations should help to give an impetus to new building.

As soon as the insured limit on FHA loans is increased above $2000 it is expected that the modernizing emphasis will be shifted away from individual dwellings toward larger projects. One proposal is that a campaign be started to "Modernize Main Street." It will direct attention to stores, apartments, and similar structures. The larger limit should also permit insured modernizing loans on factory and office building projects. There is more potential modernizing work to be done in buildings of this kind than seems to have been generally understood in the past.

On the whole our industry stands to gain much from the provisions of these two acts.

●

Local Standards for Conditioning

There continues to be a lamentable variation in the standards for design used in estimating sizes and capacities of air conditioning jobs both within the limits of metropolitan districts and from state to state. The nature of the difficulty and its effects are well recognized, but a suitable solution is not at hand. The problem is generally conceded to call for local handling for the standards are certainly subject to local conditions of climate, living habits, and trade practices. The points of greatest importance are uniform design conditions of temperature and humidity and uniform standards of performance of manufactured equipment. In many instances there are not enough data to justify action by local groups, but a program looking toward setting up suitable, equitable, and workable standards is probably as valuable as any one thing which local groups can undertake. Such movements are already under way in a number of cities. In Chicago the standards have reached the stage where they are printed and have been discussed pretty carefully. In other places outside temperature conditions for summer design have been fixed by agreement. Standards of performance are being attacked on several fronts. All movements are worthy of encouragement and support but there is also real need for being sure that the standards set are really equable and just. Speed should not be gained at the cost of fairness.

ABSTRACTS of Current Papers, Books and Pamphlets

Reference Book on Air Conditioning

One of the most noteworthy books on air conditioning that has yet appeared has been published by the American Blower Company from data compiled by the engineering staff. Like many other books issued by manufacturers, it is divided into two main sections, the first covering technical information and the second dealing with apparatus and equipment. The pages of the book are standard letter size which has permitted the reproduction of many charts and tables in a large and easily read size. A few of the more important charts are printed on double-page inserts.

The publisher has made a special effort to treat all the subjects in a practical manner so that users will be able to solve most problems by using the data presented and will require aid only on exacting or complex applications. Besides presenting the fundamental principles, laws, and tables, there are included a number of sample calculations, comprehensive information relating to dimensions and capacities, and a large amount of application data.

Although all of the book is of high standard, some of the chapters are so outstanding that they are entitled to special mention. Among these are the sections on air flow, ducts, sound and temperature and humidity control. The chapters on air flow and ducts are unusually complete and contain a large number of illustrations and examples which do much to clarify the text.

It is, however, in the chapters on sound and controls that the book makes its major contribution to air conditioning literature. In the past these subjects have been often neglected so that there is an actual scarcity of reliable information on these two important phases of air conditioning. While the sections do not attempt to completely cover both subjects, they do succeed in presenting explanations of the fundamentals and most important points from a standpoint extremely practical to the ventilating and air conditioning engineer.

The publisher is to be commended on the excellent job done in compiling, editing, and publishing this book.

[*"Air Conditioning and Engineering," edited by the engineering staff of the American Blower Corp., 6000 Russell St., Detroit. Stiff fabricoid binding; 8½ x 11 in.; 359 pages in technical section; 332 pages in equipment section. Price, $5.*]

●

Heat Power Engineering—3rd Volume

The third and final volume of the series on heat power engineering treats, among other subjects, air conditioning and refrigeration. The complete series is intended to cover the entire field of heat engineering from the viewpoint of the engineering student. The first book dealt with thermodynamics and prime movers while the second discussed steam generating apparatus, prime movers, fuels combustion, and heat transmission. The third volume besides covering air conditioning and refrigeration, discusses auxiliary equipment of power plants and plant ensemble.

As is to be expected in a text for engineering students a large amount of space is devoted to the fundamentals. This fact should make the book valuable to the heating and ventilating engineers interested in securing a knowledge of the thermodynamic principles of heating and air conditioning. The thermodynamics of the subject have often been overlooked because of the lack of a clear and concise explanation of them.

The air conditioning and refrigerating section contains information on properties of mixtures of air and water vapor, psychrometric charts, water cooling with atmospheric air, ventilation, heating, cooling, theory of refrigeration, compressors, condensers, and vacuum system of refrigeration. A large number of illustrations, graphs, and tables are used to clarify the text.

[*"Heat-Power Engineering—Part III," by W. N. Barnard, F. O. Ellenwood, and C. F. Hirshfeld. Published by John Wiley & Sons, Inc., New York; cloth-bound; 6 x 9 in.; 420 pages; price $4.50.*]

●

Hot Water and Steam Supply by Electricity

In the past few years power companies in England have done a considerable amount of work to further the use of electricity. As a result of their promotional efforts, a large number of installations for heating water by electricity have been made. It is the author's purpose in writing this book to make available to both heating and electrical engineers the latest information on heating water and generating steam with electricity.

In discussing the various forms of equipment, the theories of electrical engineering are pursued only as far as is necessary to understand the efficient use of the apparatus. Besides the large number of illustrations of equipment there is a large amount of data in both graphical and tabular form. The book should prove valuable to engineers in this country first, because of the large amount of data presented, and second, because it serves to show the progress of electrical heating in England.

[*"Hot Water and Steam Supply by Electricity," by Frank C. Smith. Published by E. & F. Spon, Ltd., London; available from Engineers Book Shop, 227 Park Ave., New York; cloth-bound; 6 x 9 in.; 150 pages; price $3.50.*]

●

Ionic Content of Air in Occupied Rooms

Measurements were made on the small ion and the large ion content of the air of a room in the main laboratory of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. It is believed that the conditions may be considered more or less representative of the general office conditions. The entire laboratory, including the particular room used for the measurements, was occupied during the daylight working hours, but was unoccupied during the night hours, on Saturday afternoons, and on Sundays. Continuous records of the small ion and the large ion content of the room air were secured, thus providing data from which mean curves were drawn to represent hour-by-hour variations for the room and building, occupied as well as unoccupied. Later, records of the same elements were secured in a room of the Administration Building of the Carnegie Institution of Washington during the annual exhibit of 1933, when large crowds of people were present in the room and building. Still later the apparatus was installed in a room of an isolated building on the grounds of the Department of Terrestrial Magnetism where special tests were made to ascertain in a quantitative way the extent to which a given number of people in the room for a given length of time would affect the small ion and the large ion content.

Records made of the ionic content of the air in a closed room show that due to occupancy the large ion content increases and the small ion content decreases. A few hours after vacating the room and building the large ion content begins to fall off. A gradual accumulation of the large ions occurred during the period of occupancy with a reverse effect in the small ion content. All of the effects were shown to be due principally to the presence of tobacco smoke or other contamination coming into the room from other parts of the building, even though all windows and

doors were kept closed except while someone was passing to or from the room.

The records made in the room where a large number of persons were attending an exhibit showed that there was an increase of large ions and a decrease of small ions due to occupancy. There was no smoking in the room. Recovery of both large ion content and small ion content was much more rapid after the building was vacated than when there was smoking of tobacco.

Special tests after the exhibit closed showed that the small ion content of the air of a closed room is appreciably decreased as a result of the room being occupied; these results are in agreement with those of Yaglou but in contradiction with those of Egloff.

Special tests indicate that about 300,000,000 charged nuclei are given out in each breath. This, in conjunction with the results by Wait on the number of condensation-nuclei given out in each breath, indicates that most of the nuclei come electrically charged from the lungs. The results further indicate that as many nuclei are charged with one sign as with the other and therefore appear to be removing no electricity from the body.

[*"Large Ion and the Small Ion Content of Air in Occupied Rooms," by G. R. Wait and O. W. Torreson. Paper presented at the 41st annual meeting of the A.S.H.V.E., Buffalo, N. Y., January, 1935; approximately 4600 words; illustrations; tables.*]

●

Water Supply Systems for Buildings

This small book gives a complete treatment of the subject of designing water supply systems for buildings. The purpose of the author is to make available, in a convenient form, some of the methods and associated data employed in laying out piping systems for supplying water. The book is concerned primarily with the physical distribution of water for ordinary purposes and is concerned with the various processes employed in the treatment of water only so far as they control or affect the physical distribution.

The material has been gathered from a wide variety of sources and is arranged in such a manner that it is very easy to use. A large number of tables and graphs are used to present the material.

The book is divided into 13 sections dealing with the following subjects: 1—a general discussion of water supply in buildings including per capita consumption of water, and rate of supply of fixtures; 2—demand of fixtures; 3—use of probability in predicting demand and consumption; 4—use of flow diagrams; 5—analysis of demands by groups; 6—determining pipe size; 7—water and its effect on materials; 8—pipe; 9—fittings and valves; 10—gravity tanks; 11—compression tanks; 12—cross connections; 13—miscellaneous notes.

Perhaps the most interesting section is that devoted to the method of probability as applied to the determination of the loading of piping systems. As the author says, little has been published on this method of determining water demand and consumption. Much space has been devoted to the method and it is deserving of careful attention.

[*"Water Supply in Buildings," by Alexander W. Moseley. Published by the Mumm Print Shop, University Place, Evanston, Ill.; paper-bound; 6 x 9 in.; 92 pages; price, $1.15.*]

●

Measurement of Air Change

To fulfill the need for a simple instrument for measuring the rate of air change in a room, there has been developed at the British Building Research Station a method which will give this information without a great deal of trouble.

The method is based on the fact that if a small quantity of hydrogen is released into the air of a room, the rate of change of concentration affords a measure of the rate of air change. Since the thermal conductivity of hydrogen is seven times that of air, traces of this gas in air can be readily estimated by a careful measurement of the thermal conductivity. This is easily performed with a katharometer, an instrument which furnishes a measure of the thermal conductivity of a gas.

The instrument is simply a Wheatstone bridge, with one arm in a cell containing normal air and the corresponding arm in a similar cell through which the room air diffuses continuously. A definite electric current flows through the bridge, heating the coils, which in turn lose heat, through the gases surrounding them, to the walls of the cells. The changes of thermal conductivity in the cell containing the room air, due to the change in hydrogen content, unbalances the current flowing through the arms and produces a deflection in the galvanometer. This deflection is a measure of the change of hydrogen concentration.

In conducting the experiment the katharometer is placed as central as possible in the room and an electric fan arranged to circulate air at floor level. Hydrogen is admitted to the air stream of the fan till the katharometer indicates a concentration of 0.2%. The fan is switched off and the katharometer read every minute for some 20 min. The readings are plotted on semi-logarithmic paper and a straight line drawn through them.

The time of one air change is determined from the graph by noting the number of minutes necessary for the hydrogen concentration to fall to 36 8% of its original value of 0.2.

The accuracy of the method was tested by placing the instrument in a room which was so built that the amount of air leaving could be measured. The tests revealed that the error varied between 0 and 7%.

[*"The Measurement of the Rate of Air Change," by W. G. Marley, Journal of the Institution of Heating and Ventilating Engineers, London, February, 1935; approximately 1500 words; 5 pages; illustrations.*]

●

Air Flow in Fan Discharge Ducts

After an examination of the possible causes of the discrepancies which are sometimes found between pitot tube measurements and nozzle measurements of the volume of air flowing in a fan discharge duct, the author reaches the following conclusions: (1) air pulsations may cause a small error; (2) incorrect location of the outermost pitot tube station results in an error of at least 0.6%; (3) pitot tube errors and non-axial flow are the principal sources of error.

Besides giving the characteristics of various pitot tubes, the paper shows that non-axial flow exists in the discharge from single inlet centrifugal and propeller type fans. It states that this discrepancy can be eliminated by the use of egg-crate straighteners which it recommends for adoption in standard test practice. The paper also indicates that the present standard length of the test discharge duct can be halved without loss of accuracy and the friction coefficient omitted.

The author recommends that for test purposes the term "velocity head" should be redefined and that a more precise specification for the pitot tube be adopted.

[*"Air Flow in Fan-Discharge Ducts," by L. S. Marks. Paper No. PTC-56-2; presented at the annual meeting of the American Society of Mechanical Engineers, December, 1934, New York; approximately 6000 words.*]

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BRIEF REVIEWS

CHEMICAL FORMULAS. A companion volume to the first Chemical Formulary, which was reviewed in this section some months ago, has been published. Like the first volume, this book contains thousands of practical formulas from all branches of industry. All of the formulas are new, none of them having appeared in the first volume. Much

(Concluded on page 77)

NEWS OF THE MONTH

22 Federal Buildings in Washington Conditioned in 1934; 61 Civil Buildings Add A.C.

WASHINGTON—There were 61 air conditioning installations in commercial and residential buildings made in this city during 1934, and in addition 22 installations in Federal government buildings. Stores, offices, and restaurants led in number of jobs in commercial buildings. There are now 26 air conditioned restaurants in this city.

Three companies, York Ice Machinery Corporation, Carrier Corporation, and Cooling & Air Conditioning Corporation, subsidiary of B. F. Sturtevant Co., Boston, have been running neck and neck in competition for the larger contracts. York apparently took the lead recently by submitting the low bid, $1,012,916, lump sum, for air conditioning the Department of Interior building, though on one of seven alternate bids, Riggs, Distler & Co., Baltimore, was lower.

Bids on one more large government contract are to be opened shortly. That is the air conditioning of the annex to the Library of Congress, which was advertised for bids January 21, and is expected to cost around half a million dollars.

There is also talk of fully air conditioning the White House, at a cost of about $150,000. At present only the executive offices and five bedrooms are air conditioned.

Practically without exception, all new buildings of the government are being fully air conditioned. The new Supreme Court building, just completed, is fully air conditioned, a $325,000 job.

The big spurt in air conditioning totals came with construction of the Archives building, the new Post Office building, the Department of Justice building, the Department of Labor building, and the Interstate Commerce Commission building, all fully air conditioned jobs which ran into six figures.

The Post Office building air conditioning was done by Mehring Hanson, Chicago, using York Ice Machinery equipment, at a cost of about $500,000, and Riggs, Distler & Company did the Justice building, approximately an $800,000 project.

Raisler Heating Co., New York, was low bidder at $313,000 on a contract for air conditioning the Treasury, to be awarded soon. The same company air conditioned the accounting room of the Treasury at a cost of $11,000 last year.

The accompanying table summarizes the air conditioning installations in Washington.

Type of Establishment	Prior to 1934		1934		Total	
	No.	Hp.	No.	Hp.	No.	Hp.
Industrial	7	128	1	28	8	156
Stores	17	387	20	500	37	887
Residences	15	41½	9	12	24	53½
Restaurants	20	799¾	16	564½	36	1364¼
Theaters	5	2032	—	—	5	2032
Mortuaries	1	15	—	—	1	15
Beauty shops	1	1½	1	11½	2	13
Offices	9	678	11	447¾	20	1125¾
Church	1	48	—	—	1	48
Bowling alley	—	—	1	3	1	3
Hospitals	1	90	1	28	2	118
Hotel rooms	—	—	1	51	1	51
Library	1	28	—	—	1	28
Radio station	1	10	—	—	1	10
Total	79	4258¾	61	1645¾	140	5904½
Federal	15	430	22	14,222	37	14,652
Grand Total	94	4688¾	87	15,867¾	177	20,556½

Show Postponed

CHICAGO—The air conditioning show of the National Society of Air Conditioning Engineers, scheduled to be held in the Merchandise Mart here, May 20-25, has been indefinitely postponed.

$1.46 Million Profit for American Radiator

NEW YORK—In the annual report for the stockholders of the American Radiator and Standard Sanitary Corporation Clarence M Woolley, chairman of the board, pointed out that during the past five years, the total number of homes erected has not been sufficient to meet the need created by the natural forces of marriage, fire, and obsolescence. Figures for 257 cities show 296,000 home units built in the period as compared with 1,992,000 for the previous five years.

According to Mr. Woolley, there has been only one home erected for every 16 marriages, while from 1925 through 1929 there was a new home constructed for every three marriages. Fire loss has been estimated at 30,000 homes a year, and, on the basis of a 40-year obsolescence period for buildings, 511,000 homes have become obsolete every year since 1930.

Last year, the construction of new homes declined from 24,557 built in 1933 to 20,846, although total construction increased about 4% apparently due to the erection of large buildings under the government public works program, he explained.

There is evidence, he said, that the nation is facing an acute shortage in provisions for shelter itself. During the depression, he continued, people doubled up, living two or more families in a house, but despite this condition a survey by the National Real Estate Board showed no surplus of homes at the end of 1932 in 76% of the cities surveyed. At the end of 1934 it showed a shortage in 53%, with a normal condition in 42% and an overage in only 5%.

Rents were reported to be on the up-grade in 53% of the cities, stationary in 38%, and on the down-grade in only 9% in 1934.

Concerning the general industrial situation, Mr. Woolley said that technological improvements made recently in all branches of industry to lower prices and improve products have made possible broader consumption.

Closed factories, he explained, particularly in the heavy industries, where shut-downs have been extensive, will have to be rehabilitated as they are reopened under the impetus of the potentially increased consumption. This, he continued, will create work for the building, machine tool, and other industries, stimulating the entire industrial structure of the nation.

In 1934 American Radiator and Standard Sanitary Corporation had a net profit of $1,455,227 as compared with a loss of $881,575 for 1933 and a loss of $5,990,986 for 1932.

Mr. Woolley declared that the European affiliates of his company had all showed progress during the year just past and that the building programs under way in these countries promised consistent progress for the future. Charges for depreciation and depletion made by the company last year were $4,291,544 as compared with $4,151,153 for 1933 and the company's surplus as of December 31, 1934, was $34,568,627. The net asset or book value of the common stock of the company stands at $12.03 per share.

AOBA Holds Annual Meeting Elects Smith

ATLANTIC CITY — The American Oil Burner Association, at its 12th annual convention at the Claridge Hotel here, April 8-9, voted to return to its original status as a manufacturers' organization. On the program for the first day was a regular quarterly meeting of the board of directors. On the second day were held the annual meeting and the first meeting of the new board. In the evening the association held its annual dinner, when Edward P. Bailey, toastmaster, presented aladdin lamps to R. M. Sherman, retiring president; C. J. Bassler, retiring chairman of the dealer division, and Harry F. Tapp, former executive secretary. W. J. Smith was elected president for the coming year. The new president of the association is vice-president and general manager of the Cleveland Steel Products Corporation.

President Smith announced that the executive committee had been empowered to formulate plans for a new program of association activities which would be presented for approval and acceptance at the next board meeting in July in Cleveland.

Certified A.C. Subject at Chicago Meeting

CHICAGO — All attendance records of the Illinois chapter, A.S.H.V.E., were broken at the April 8 meeting, when 276 members and guests were present.

S. R. Lewis, chairman of the meeting, presented for general discussion, section by section, the "Standards for Certified Air Conditioning for Comfort."[1] It was apparent that a considerable amount of discussion would follow. This discussion included remarks by Messrs. Aeberly, Factor, Harbula, H. Hart, Hattis, Hill, Brooke, Sutcliffe, Hoier, and others.

The chapter unanimously passed the following resolution:

"It is the consensus of the Illinois chapter members that the committee, of which S. R. Lewis is chairman, has done a good piece of work; that we endorse in general the 'standards for Certified Air Conditioning for Comfort,' calling attention of the committee that some of the premises are subject to change as established advances occur; until such time as our knowledge is more complete, we accept the 'standards' as written."

A certificate of life membership in the A.S.H.V.E. was presented to Richard H. Thomas who then told of many interesting incidents in his early experience in heating and ventilating work.

[1]These are described in some detail on page 34.

Sessions on Codes, Promotion, and Technical Papers Scheduled for Contractors Convention

NEW YORK — The 46th annual convention of the Heating, Piping and Air Conditioning Contractors National Association will be held at the Hotel Gibson, Cincinnati, May 20-22. There will be a session on sales promotion, another on codes, and another on technical problems, according to the tentative program. The program follows:

MAY 20

9 *a.m.*—Address of welcome, Mayor of Cincinnati.
President's address, J. Lawrence DeNeille.
Report of treasurer, M. J. Chagnard.
Report of auditing committee.
Report of national headquarters, S. Lewis Land.
Address, speaker to be announced.

MAY 21

9 *a.m.*—Report of committee on trade promotion, Herbert A. Snow, chairman.
Report of committee on certified heating, J. P. Baldwin, chairman.
"Sales Promotion from the Point of View of the Manufacturer," Russell G. Creviston, sales promotion manager, Crane Co.
"Sales Promotion from the Point of View of the Wholesaler," speaker to be announced.
"Sales Promotion from the Point of View of the Contractor," Justin A. Kiesling.
2 *p.m.*—Special code session to be conducted by the Divisional Code Authority, Robert D. Williams, chairman, Divisional Code Authority, presiding.
Remarks by chairman, Robert D. Williams.
Report of executive director, Joseph C. Fitts.
Round-table discussion on codes.

MAY 22

9 *a.m.*—Report of membership committee, M. J. Chagnard, general chairman.
Address, M. J. Beirn, vice-president and general manager of sales, American Radiator & Standard Sanitary Corp.
Report of committee on welding, John H. Zink, chairman.
Report of sub-committee on boiler output, Harry M. Hart, chairman.
Report of committee on air conditioning, Horace E. Wetzell, chairman.
Address, "What's Involved in the Sale of Air Conditioning," J. J. Nance, manager of air conditioning division, Frigidaire Corp.
2 *p.m.*—Report of convention committees.
Election of officers.
Installation of officers.

Toronto to be Meeting Place for A.S.H.V.E.

TORONTO—The Ontario chapter of the A.S.H.V.E. will be host to the members for the semi-annual meeting of the society at the Royal York Hotel here, June 17-19.

Technical sessions will be held each morning in the ballroom of the hotel. Among the subjects of the papers to be discussed are: Performance of Registers and Grilles; Classroom Odors with Reduced Air Supply; Discussion of Certified Air Conditioning, and An All-Electric Heating and Cooling System.

The committee on arrangements of the local chapter has arranged a varied entertainment program, which will include sightseeing and inspection trips, a golf tournament, and special luncheon, tea and card parties for the ladies.

The committee on arrangements announced by President Blackhall of Ontario chapter is composed of: Chairman, E. H. Gurney; vice-chairman, L. L. Anthes; finance, M. F. Thomas; publicity, E. R. Gauley; ladies, H. B. Jenney and Mrs. E. H. Gurney; banquet, Thomas McDonald; entertainment, W. P. Boddington; transportation, M. W. Shears; reception, H. H. Angus; registration, J. S. Paterson, and secretary H. R. Roth.

Contractor Opens A.C. Dept.

BALTIMORE—The Mechanical Engineering Construction and Equipment Company, mechanical contractor, has opened an air conditioning department in charge of Albert R. Simpson.

Mr. Simpson was formerly a sales engineer in the Baltimore territory for John J. Nesbitt, Inc., Philadelphia.

Howatt Speaks at Buffalo

BUFFALO—President John Howatt of the A.S.H.V.E. addressed the Western New York chapter of the society at its meeting at the Touraine Hotel here, April 9, with 38 members and guests attending.

President Howatt's topic was "Our Position Today." In his preliminary remarks President Howatt outlined the present status of building and construction with respect to comparative volume and economic conditions. He then discussed the definition of air conditioning and stressed three phases of it—(1) for comfort; (2) for industrial processes; (3) for health.

In conclusion he outlined a three-point plan for future attainment—(1) to establish definite standards of air conditioning, which will be understood and accepted by not only the engineer, but also the public. (2) To stress and advance to the public the health and comfort possibilities of air conditioning. (3) To strive for the general recognition of the society and its work.

Tax on Fuel Oil Proposed in House

WASHINGTON—A bill, H. R. 5268, was recently introduced in the House of Representatives by Congressman Wesley Lloyd of the State of Washington, providing for a tax on fuel oil of ½ cent per gal. The bill has been referred to the Ways and Means Committee, and a hearing on the measure is expected shortly.

The AOBA, through its acting secretary, C. F. Curtin, opposed the passage of this bill on the grounds that it was discrimination against the oil burner industry in favor of a competitive one.

A.S.H.V.E. to Award Medal

NEW YORK—The Council of the A.S.H.V.E. announces that the F. Paul Anderson Gold Medal will be awarded at the 42nd annual meeting of the society in Chicago, January 27-31, 1936. Prof. G. L. Larson, chairman of the committee on award, has outlined the conditions under which the medal is to be presented: (1) Any member of the A.S.H.V.E. in good standing during 1935 is eligible for nomination; (2) Each nomination sent to the committee on award must be accompanied by a statement of the candidate's accomplishments, specifically mentioning the work done or services performed and indicating in what way such work or services have been outstanding in the field of heating, ventilating, or air conditioning, during 1935 or any year prior thereto, and (3) All nominations must be in the hands of the committee on July 1, 1935, and are to be addressed to the committee on F. Paul Anderson medal award, c/o secretary, American Society of Heating and Ventilating Engineers, 51 Madison Ave., New York.

The F. Paul Anderson award was created and announced at the 36th annual meeting of the society by President Thornton Lewis and the first presentation of the medal was made to W. H. Carrier at the 38th annual meeting of the society in Cleveland, January, 1932.

West Michigan Group Inspects Paper Mill

PARCHMENT, MICH.—R. B. Hayward, general manager of the Kalamazoo Vegetable Parchment Company, described the heating and ventilating problems in paper mills before the April 8 meeting of the Western Michigan Chapter of A.S.H.V.E. Talks were also given by A. N. Petersen, who described the new power plant installation at the paper mill, and by R. S. Clark and C. R. Gibbs. Following the talks the chapter was taken on a trip through the paper mill.

At the March 11 meeting held in Muskegon, a message from President Howatt to the chapter was read, and F. M. Young, president, and Ernest Witzel research engineer, of Young Radiator Company, described the construction features and application of heat transfer surface.

Use Smith Psychrometric Chart

SAN FRANCISCO—The air conditioning class at the University of California and at Leland Stanford University are using a psychrometric chart developed by Morton B. Smith of the Hammond Lumber Company of this city.

Illinois to Hold Short Coal Course

URBANA, ILL.—A short course in coal utilization will be held at the College of Engineering, University of Illinois, June 11-13. The course is offered by the department of mining and metallurgical engineering and the department of mechanical engineering. There will be no registration or tuition fee. Last year the enrollment totalled 148.

On June 12 there will be an all-day boiler test on a stoker-fired steel boiler at which time those attending are welcome to visit and secure their own data and ask questions.

Furnace Men to Meet in Columbus

COLUMBUS—The National Warm Air Heating and Air Conditioning Association will hold its summer meeting in the Deshler-Wallick Hotel here June 4-6. The first day will be devoted to committee and group meetings, while the convention sessions will occupy the second day. There will be a convention session on the morning of the third day and a golf tournament that afternoon.

The program will include the following:

Fundamentals in air conditioning; A.B.C.'s of the Standard Code; trouble jobs — responsibility of the manufacturers, jobber, and dealer; industry's installation codes; NRA codes; work of the technical educational committee; this warm-air furnace business; engineering—benefit or bunk; control of fans and blowers in warm-air heating plants.

Pocock Appoints Hayward

PHILADELPHIA — Announcement was made recently by J. J. Pocock, president of J. J. Pocock, Inc., Philadelphia, distributor of Frigidaire refrigeration and air conditioning equipment, of the appointment of D. T. Hayward as sales manager of air conditioning and commercial refrigeration for the Philadelphia district. Prior to this appointment he has been serving the Frigidaire factory in the capacity of regional representative, contacting Frigidaire distributors in the east central region.

D. T. Hayward

Mr. Hayward started his career in refrigeration in 1926 as a salesman for the Memphis Frigidaire distributor. For a number of years Mr. Hayward specialized in the specification and sale of Frigidaire's commercial line of refrigeration equipment for commercial enterprises.

Denver Utility Promotes A.C.

DENVER—A campaign to promote the idea of air conditioning, educate the public to its benefits, and inform them as to how it can most efficiently be accomplished in a high and dry climate has been launched by the Public Service Company of Colorado.

This is one of the first concerted efforts towards the advancement of air conditioning in this region and is the result of a thorough study of the physical problems involved and of the possible market for the proper equipment.

Fifty salesmen of the gas heating department of the company comprise the principal medium of the campaign. They have been given an elementary education in all phases of air conditioning in a series of instruction classes.

In soliciting prospective gas heating customers and in servicing existing gas heating systems, these salesmen are introducing the subject of air conditioning.

A survey of the 57,000 homes in Denver revealed that there are only about 400 forced air central heating plants of all kinds and only about 100 to 150 plants intended to fully condition the air. A decided change has been noted in the attitude of contractors and architects towards air conditioning in the last six months. Whereas three years ago there appeared to be a lack of interest, a number of prominent builders include air conditioning as a regular part of the equipment now, and probably half of the new homes in the moderate price range now under construction will be air conditioned.

Detroit Meeting Sponsored by Universities

DETROIT—The regular meeting of the Detroit chapter, A.S.H.V.E., was held March 11 at the Wardell Hotel with approximately 70 members and guests present. The meeting was officially announced as the Annual University Night, the program being furnished by the universities of Michigan and Detroit.

The first speaker was Prof. Axel Marin of the University of Michigan. His discussion of "Teaching Engineering" brought out the recent changes which have been made in university curriculum to broaden and supplement the technical training received in the engineering schools with business administration and law.

The latter part of the program was supplied by the University of Detroit. Prof. F. J. Linsenmeyer discussed the testing of vacuum pumps and stressed the much overlooked fact that the capacity of vacuum pumps as air eliminators is seriously reduced with increased temperature of return.

First National Convention of Burner Dealers Has Unexpectedly Large Attendance

NEW YORK—A lively meeting, well-attended sessions, and exhibits by 80 manufacturers from individual hotel rooms were features of the first annual convention of the National Oil Burner Dealers Association, held at the Pennsylvania Hotel here April 2-3.

The program for the first day included a meeting of the board of directors at which Leonard C. Smyth, president of the association, announced that the organization was increasing its membership nationally to a place where it would soon be representative of the retail oil burner outlets of the chief marketing centers of the country.

The meeting held in the afternoon was attended by 500. Mr. Smyth presided and after routine matters were disposed of, the association elected the following officers for the ensuing year:

President—Leonard C Smyth, Montclair, N. J.; vice-presidents—Albert G. Baerenklau, Brooklyn, N. Y.; Charles R. Kahn, Jamaica, N. Y.; Hans Lieblich, New York; Otto Peterson, New York; Albert Buckley, Providence, R. I.; Arthur Hahn, Utica, N. Y.; Ray Porter, Minneapolis, Minn.; A. Michaels, Portland, Ore.; C. J. Bassler, Chicago; W. J. Harter, Rockville Centre, N. Y.; directors—Harry L Bloomberg, Brooklyn, N. Y.; R. S. Bohn, New York; Harry Epstein, Brooklyn, N. Y. T. A. Snow, Boston; Glen Hill, St. Louis; E. L. Holmes, Elizabeth, N. J.; Max Kasner, Brooklyn, N. Y.; Thomas Larkin, Troy, N. Y.; A. C. Schroeder, New York; Arthur W. Nelson, Brockton, Mass.; James M. O'Brien, Flushing, N. Y.; John Perass, Brooklyn, N. Y.; Albert K. Perego, Milwaukee; Meyer Schofer, Baltimore; Harold L. Schultz, Syracuse, N. Y.; Leo Setlow, New Haven, Conn.; Curtis Steuart, Washington, D. C.; W. W. Stuart, Des Moines, Ia.; Homer A. Tiffany, Ridgewood, N. J.: executive committee—Leonard C. Smyth, president; Albert G. Baerenklau, vice-president; Charles R. Kahn, vice-president; Hans Lieblich, vice-president; Otto Peterson, vice-president; Arthur W. Clark, executive director; Irving A. Heimlich, general counsel.

The meeting went on record by resolution as opposed to the marketing of oil-burning equipment as a medium to obtain fuel oil gallonage and protested the method of some of the large major and independent oil companies in selling oil-burning equipment. The resolution called for the united action of NOBDA and AOBA in starting an investigation by the proper agencies of the government of such practices.

The meeting of the new board of directors in the evening approved plans for major activities of the association during the coming six months that will enable the dealer to understand the responsibilities of his business better and further made arrangements to oppose local legislation to tax fuel oil.

At the morning sales conference April 3, John W. Scott, president of Buckley & Scott Utilities Co., Boston, presided. Walter O. Harvey, president of Harvey-Whipple, Inc., Springfield, Mass., spoke on the subject of "Where Do We Go from Here—Cooperation or Chaos?"; M. Zenn Kaufman, author, spoke on "How to Run Better Sales Contests"; F. H. VanBlarcom, general manager of Lynn Products Co., Lynn, Mass., discussed "The Sale of Distillate Burner Equipment by Power Burner Dealers"; J. L. O'Brien, manager of Toridheet Division, Cleveland Steel Products Co., Cleveland, spoke on "Organizing Oil Burner Sales to Meet Present Day Conditions."

At the afternoon merchandising session R. S. Bohn, president, Preferred Utilities Co., New York, presided. Speakers and subjects were as follows:

John A. Berghoff, vice-president and general manager, Wayne Oil Burner Corp., Fort Wayne, Ind., spoke on "The Future of the Oil Burner Industry as Viewed by a Manufacturer"; Ralph B. Wilson, vice-president, Babson's Statistical Organization, Wellesley, Mass., talked on "Government and Business"; A. J. Fleischmann, president, May Oil Burner Corp., Baltimore, spoke on "Selling at a Profit," and W. A. Scherff, manager, oil furnace sales, General Electric Co., New York, spoke on "Out of the Price Field with Boiler-Burner Units."

O.B. Law Defeated in Massachusetts

BOSTON — Local oil burner interests have succeeded in killing a bill introduced in the Massachusetts Senate providing for a board of examiners to ascertain the fitness of oil burner mechanics to install, repair, and maintain oil burners and oil-burning equipment. This was accomplished through the efforts of the legislative committee of the Boston Oil Burner Associates.

A similar bill was introduced last year, or in much the same form, and it was agreed by the oil burner men that it was wholly unnecessary and might work tremendous damage by creating a shortage of competent mechanics during the busy season for oil burner installations and prevent the training of men for that line of work.

Kratz, Helmrich on Detroit Program

DETROIT—The regular meeting of the Michigan chapter, A.S.H.V.E., was held at the Wardell Hotel, April 1. About 125 attended the meeting.

The first speaker of the evening was Prof. A. P. Kratz, University of Illinois, who described the summer cooling project in the research residence at the University of Illinois. He was followed by George Helmrich, of the Detroit Edison Company, who gave a similar talk on test work being conducted by that utility.

Southern to Condition 150 Sleepers

WASHINGTON — A $1.2 million program of air conditioning its Pullman cars for all important through trains was announced April 1 by the Southern Railway.

The work of installing air conditioning equipment in 150 sleeping cars, at a cost of approximately $8,000 a car, will be done in the Pullman Company shops.

In addition the railroad said such equipment will be placed in 25 of its dining cars, the work to be done in the company's shops.

(Left) President L. C. Smyth of NOBDA confers with Executive Secretary Arthur W. Clark. (Center) John W. Scott presiding at the morning sales conference, April 3. (Right) Lionel Jacobs, left, and President Smyth.

A.S.R.E. to Have Air Conditioning Session at Meeting

DETROIT—A technical program featuring expert treatment of 1935 problems will be offered at the 22nd spring meeting of the American Society of Refrigerating Engineers to be held in Detroit May 22-24. George Bright is general chairman of the committee in charge. Headquarters will be the Hotel Statler.

The program follows:

MAY 22

10 a.m. *Topic: Air Conditioning.*
Chairman: Harry Harrison, president, A.S.R.E.
"Air Conditioning and Odor Control," Philip Drinker, Harvard School of Public Health, Cambridge, Mass.
"Window Glass as Insulation," Libby-Owens Glass Co., Newark, Ohio.
Inspection of hotel cooling equipment, Hotel Statler, convention headquarters.
12:30 p.m. Welcome luncheon.
2:30 p.m. Trip to Ford or Kelvinator plant.
A.S.R.E. golf tournament.

MAY 23

10 a.m. *Topic: Commercial Machinery.*
Chairman: George B. Bright, past president, A.S.R.E.
"Refrigerated Display Windows," H. C. McPherson, Cincinnati.
"Absorption Refrigeration," B. H. Jennings, department of mechanical engineering, Lehigh University, Bethlehem, Pa.
"Government Financing of Building Improvements," FHA, Washington, D. C.
12:30 p.m. Council luncheon.
2:30 p.m. Leave for Greenfield Village.
6:30 p.m. Dinner at Dearborn Inn.

MAY 24

10 a.m. *Topic: Progress in Standards.*
Chairman: S. C. Bloom, vice-president, A.S.R.E.
"Rating and Development of Extended Cooling Surfaces"
"Industrial Machine Standards."
"Rating Commercial Equipment."

Insulite Holds Sales Meetings

MINNEAPOLIS—"Active Selling of Better Products" was the keynote of two recent important sales meetings held by The Insulite Company in New York and Chicago, which were attended by the entire field force of the organization as well as its executive sales officers and representatives of its engineering and products department from Minneapolis headquarters. At these meetings, the company announced several important additions to its line of insulation boards.

In his addresses to both meetings, E. H. Batchelder, Jr., vice-president in charge of sales, said, in part, "The government and the press have recognized that for the country to survive, the building industry must be tremendously revived. Certain programs, such as section 1 of the National Housing Act, are already producing results of enormous importance to every one of us, and if we are to benefit fully from the reawakening of America's home consciousness, we must direct our sales efforts along sound, practical and active lines.

Washington Post Office A. C. Plant Described

CHICAGO—The regular meeting of the Chicago section of A.S.R.E. was held at the Chicago Engineers Club on March 27, with 65 members and guests attending. The guest of honor was Ernest J. Kreutgen, postmaster of Chicago, who spoke of the interest of his department in air conditioning and also gave a resumé of the magnitude of the Chicago Post Office, which is the largest in the world.

George Dickerson, vice-president of Mehring & Hanson, presented a paper entitled "Air Conditioning in the New Post Office Department Building, Washington, D. C."

The speaker described the huge structure, which covers a ground area of 261,000 sq. ft, of a most unusual shape. The air conditioning system was described as being of three distinct types: first, as a plant delivering primary air to units beneath windows in the individual offices of the general office space; the second type introduces conditioned air by booster fans for the postmaster general's office. Primary air is mixed with a portion of recirculated air before being discharged into this room through specially designed grilles. The third type is in the cafeteria operated only a short time each day, and draws conditioned air from a basement areaway through a by-passed dehumidifier and introduces it into the dining room through ceiling air inlets.

The central refrigerating plant has two 600-ton duplex four-cylinder reciprocating compressors. each driven by a direct-connected 700-hp, 2300-volt synchronous motor at a speed of 257 r.p.m. In addition there is a 300-ton similar single compressor with a 550-hp. motor The condensing equipment is of the multipass shell and tube design totalling 9000 sq. ft. of surface.

Holt Advanced

CAMBRIDGE, MASS.—The promotion of Prof. James Holt to the rank of associate professor of mechanical engineering was announced at the Massachusetts Institute of Technology April 17. Professor Holt is widely known as an authority on heating and ventilating engineering, and is the author of many papers and technical articles on various engineering subjects.

Professor Holt was graduated from Harvard and Technology, where he was awarded the degree of bachelor of science in 1918. The following year he was appointed a designer in the American Printing Company, and after considerable industrial experience he returned to M.I.T. in 1924 to join the staff as an instructor. His promotion to assistant professor came in 1927.

Coal Mine Ventilation Discussed in Denver

DENVER — Ventilation of coal mines occupied a prominent place on the program of the 33rd annual convention of the Rocky Mountain Coal Mining Institute here March 18-20. Registration included leading coal operators of Colorado, New Mexico, Utah, and Wyoming.

The subject of mine ventilation was introduced by A. E. Condon, ventilation engineer of the Jeffrey Manufacturing Co., Columbus, Ohio. He presented a paper on "Modern Fans and Their Application in Coal Mines."

Referring to the ventilation system. Mr. Condon deprecated the fact that most mines at present are using systems which give between 30 and 40% efficiency, whereas a simple survey and installation of proper equipment can raise this efficiency to 70% or even higher.

He recommended attacking the problem from two angles: first, conditions inside the mine; then, the ventilating plant itself.

The mine should be studied to ascertain just what volume and pressure of air is required, he said. The two factors to consider are the number of breathing units and the atmospheric condition of the mine. Usually 100 to 500 c f.m. per person at from 3 to 4 in. pressure are required, he estimated.

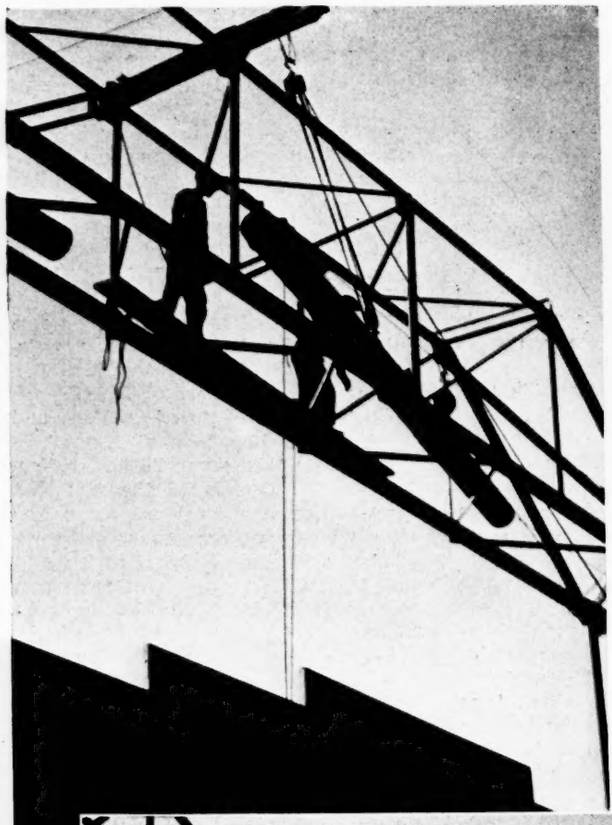
The next inside problem is to assure an unobstructed air passage with a minimum loss through leaks, by improving or constructing airtight stoppings, doors, and overcasts. A separate air shaft if properly located will cut resistance in a mine with a complicated structure to one-fourth the original.

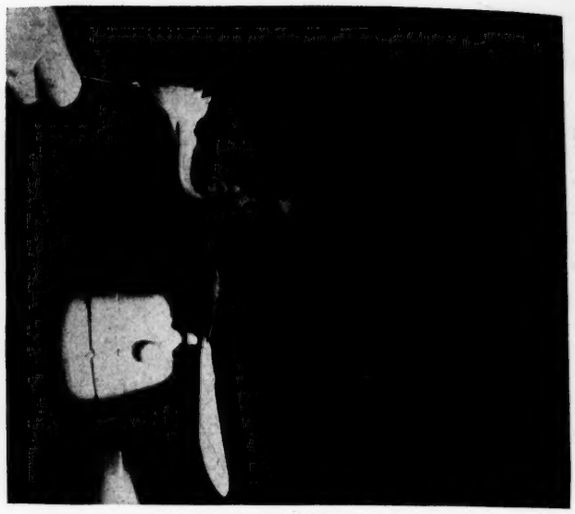
Having ascertained the desired capacity, the ventilating plant may be chosen. Mr. Condon pointed out four prevalent types of inefficientt plants, the replacement of which can bring about a saving in ventilating expense of from 25 to 75%. They are: fans that are too large and operating under normal capacity; fans that are too small and operating above normal; old, wooden-housed, grease-soaked fans which present a fire hazard, and old style direct propulsion or disc type fans.

Utility Sponsors A.C. Show

CHICAGO—The fourth annual air conditioning show will be held in the main Commonwealth Edison Electric Shop, 72 West Adams Street, starting early in May.

The leading manufacturers of air conditioning equipment will have exhibits and give demonstrations. Electric room coolers, which are especially adapted to the home and office, will be included in the exhibits. Admission to the show will be free.



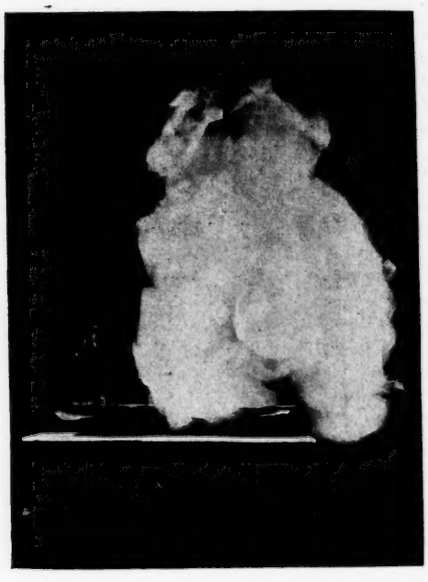


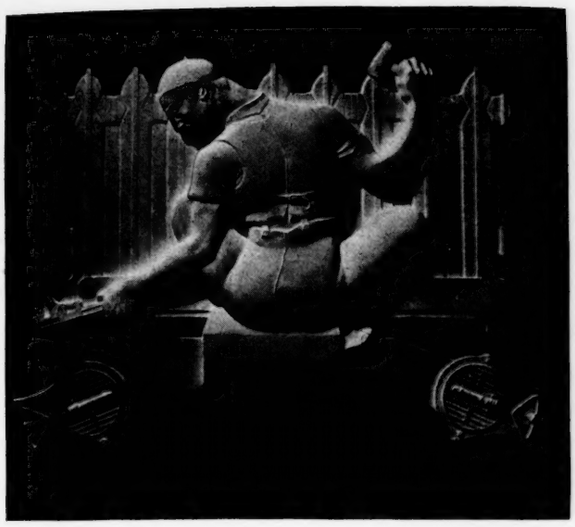
SMOKE RINGS, caught by high-speed camera, in study of the causes of noise in an electric fan. Blades, though apparently motionless, are revolving at high speed, motion stopped by an exposure of 1/75,000th second. The vortices indicate air turbulence. Photograph by Prof. Harold E. Edgerton and Kenneth J. Germeshausen, Massachusetts Institute of Technology.

PICTURE

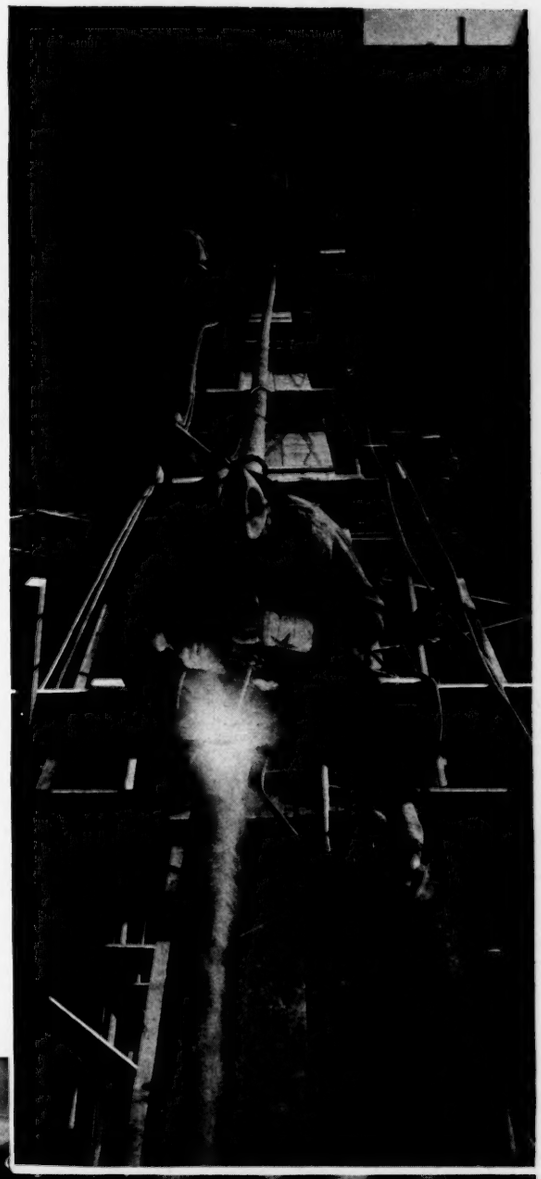
AERIAL PIPE LINE. All-welded, 8368-ft. line carries steam over roads and marsh between two industrial plants near Baltimore. Upper view shows stringing pipe on the overhead structure while the lower illustration shows two horizontal expansion loops. Courtesy Air Reduction Sales Co.

GLASS WOOL. The relative volume of glass wool as compared to an equivalent weight of glass in an ordinary bottle. This wool is used for insulation. Courtesy Owens-Illinois Glass Co.





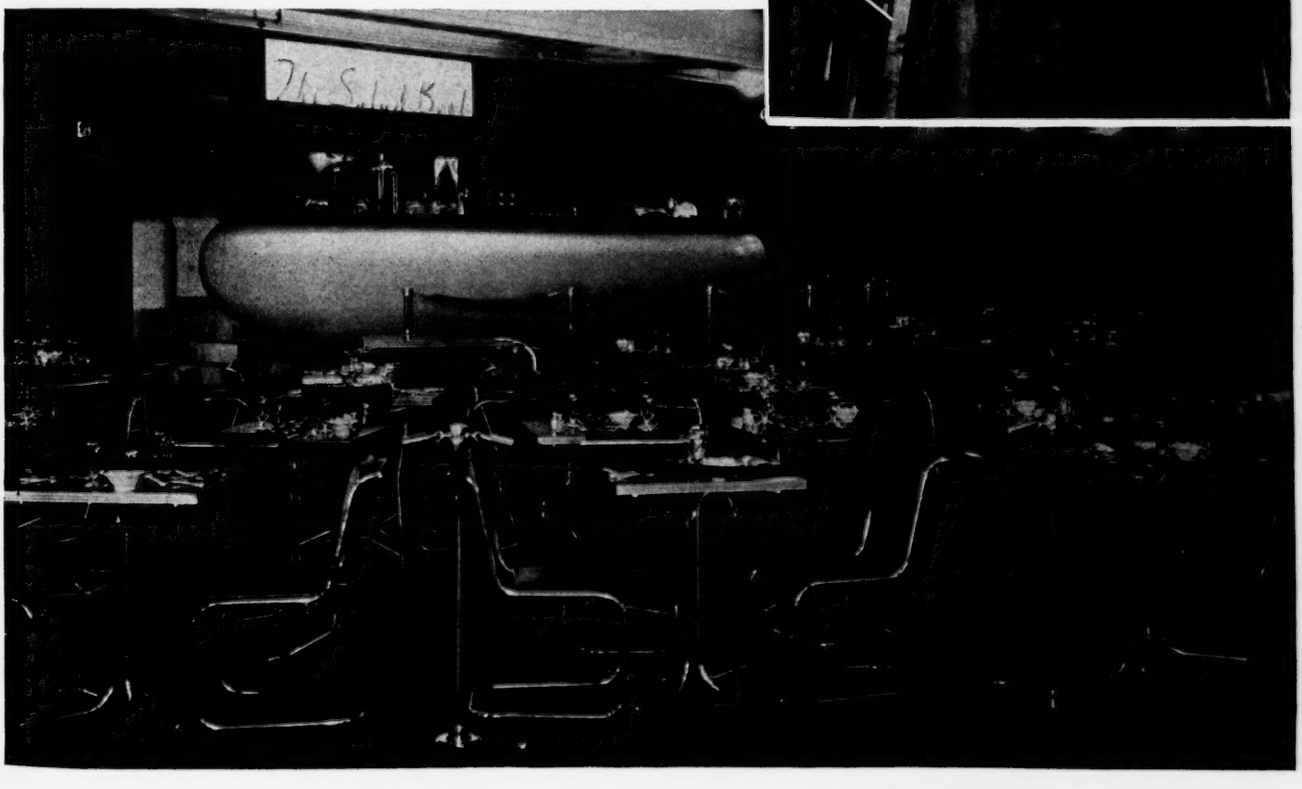
THE FITTER. A ceiling relief in the Henry Florence Hall of the new Royal Institute of British Architects building, London. Courtesy "Journal of the Royal Institute of British Architects" and "The Heating and Ventilating Engineer," London.



PARAGRAPHS

ARC WELDING IN FREEZING WEATHER. A 2260-ft. steam line was recently completed in Cleveland in subfreezing temperatures. The line serves the Pennsylvania Railroad yards. Courtesy The Lincoln E'ectric Company.

AIR CONDITIONED SALAD BOWL. A huge serving counter in the William Filene's Sons Company department store, Boston. Fifteen-minute service is featured. Ducts are decorated to resemble beams.



New Contractor Association Holds First Annual Dinner-Dance in New York

NEW YORK—The Association of Heating Contractors of Greater New York, Inc., held its first annual dinner-dance and entertainment at the Folies Bergeres, April 10. About 400 attended.

The dance was in charge of an entertainment committee consisting of Ben Spiegel, S. Lanoil, and Max M. Weiss.

The association was formed recently for the purpose of promoting the welfare of persons engaged in the heating industry, to elevate the standards of ethics, and to promote and maintain a feeling of good fellowship and friendship among its members. Any member of the heating industry is eligible for membership, providing he transacts business in Greater New York.

The officers of the association are as follows: Jacob Miller, Universal Heating Company, president; Philip Wolf, City Contracting Company, vice-president; Max M. Weiss, M. M. Weiss Company, secretary, and Jacob Kessler, Jacler Heating Company, treasurer.

The board of directors consists of: David Brown, Alfred Hering, William Marshall, Jacob Kessler, Jacob Miller, Morris Farbman, and Philip Wolf.

Members of the association include: *Contractors*—Universal Heating Company, Jacler Heating Company, D. Brown, City Contracting Company, Hering Heating Company, M. Farbman & Son, Gruen Engineering Company, Rifkind & Marshall, Sloan & Greenberg, Consolidated Heating Corporation, Samuels & Dickstein, M. Stern, Atwater Heating Company, Lanoil Heating Company, White & Josephson, Hetterick Heating Company, Parisi Heating Company, and Al Brown & Sons Heating Company. *Jobbers*—Daniel-Morris Company, N. Y. Plumbers Specialty Company, Paragon Oil Company, Grinnell Company, Davis & Warshow, Behrer & Company, A. Shapiro & Company, Sam S. Glauber, Inc., and J. Hittner & Sons. *Manufacturers*—Richardson & Boynton Company, Kewanee Boiler Corporation, E. B. Badger & Sons Company, American Radiator Company, International Boiler Works, Pacific Steel Boilers, Hart & Crouse, Evry-Use Products Company, Inc., Taco Heaters, Titusville Steel Boiler Company, and Brettler Steel Tank Works.

The association welcomes as members desirable heating contractors in the Greater New York territory, according to Philip Wolf, vice-president.

1103 Heating Jobs in Frisco Campaign

SAN FRANCISCO—This city was one of the first cities to organize a Better Housing Campaign with the assistance of FHA. Its success with a plan largely devised by its own business leaders attracted national attention and at the request of Administrator Moffett the history of the campaign has been published.

Involved in the $10,903,069 in signed pledges were 37,775 jobs, 1,103 jobs being for heating equipment. A total of 11.845 individual pledges were obtained from 74,852 contacts of property owners and tenants. The yield of pledges was 15.83%, the original estimate being 12.5%. The per capita pledge was $15.57, a better ratio than has been attained in any similar campaign.

Smith Heads Boiler Builders

WESTFIELD, MASS.—Edwin W. Smith of this city, president of the H. B. Smith Company, has been reelected chairman of the Institute of Boiler and Radiator Manufacturers. J. F. McIntire, of the United States Radiator Corporation, has been renamed vice-chairman. Mr. Smith automatically becomes chairman of the code authority for the cast-iron boiler and cast-iron radiator industry.

President Howatt Addresses N. Y. Chapter

NEW YORK — Over 60 members and guests attended the April meeting of the New York chapter A.S.H.V.E. at the Building Trades Club April 15. The meeting was featured by the presence of the national president, John Howatt; a proposal by Walter L. Fleisher, chairman of the finance committee in charge of research work; by the annual election of officers, and by the presentation of a life membership certificate to Thomas E. Crone of Pierce, Butler & Pierce Manufacturing Corporation.

President Howatt, who is making his annual swing around the chapters, laid emphasis on heating, ventilating, and air conditioning work in school buildings, with which practice he is especially familiar because of his position as chief engineer of the Chicago School Board. He expressed the opinion that instead of there being any falling off in the number of new school buildings constructed there would be a substantial increase. He also outlined his ideas of air conditioning and proposed that the society and its chapters take active steps to set up appropriate standards of practice.

Mr. Fleisher proposed that the society accept a new viewpoint regarding the scope of its membership and the method whereby its research activities should be financed. He outlined his ideas specifically by proposing that membership be greatly broadened and that an attempt be made to set up a substantial endowment fund initially not less than $1 million to support research on the relation of air conditioning to well-being.

The first annual dinner-dance of the Association of Heating Contractors of Greater New York at the Folies Bergeres, New York, April 10.

Carlisle Addresses Boston A.C. Bureau, Urges Definite Nomenclature for Conditioning Functions

BOSTON—At the monthly meeting of the Air Conditioning Bureau April 17, resolutions of sympathy with the family of the late Bowen Tufts, banker and a member of the bureau, were passed and a copy sent to the family. Guest speakers at the meeting were Donald T. Carlisle, head of the commercial advertising department, Doremus & Company advertising agency, Boston, and Taylor P. Calhoun, president of the Taylor P. Calhoun Company, Worcester, manufacturer.

Mr. Carlisle, the first speaker, said in part:

"I am not an advertising expert in air conditioning, although I've spent many years in advertising, and I'll have to talk about air conditioning as an advertising man looking at the product and the market quite objectively. Men who have spent many years in the business, tell me a five billion dollar market awaits you. This figure seems to me to be fair, considering the industries that have been built in the last 25 years.

"Before I go further in this matter, let me say that I believe the eventual market for your products will be in homes, but that for the present the market will continue to be confined to industrial applications, stores, and public buildings.

"The domestic extension of the market for air conditioning equipment will depend upon the rate and amount of education you give to the homeowner and the rate at which homeowners' money accumulates for the purposes of home improvements, repairs, and replacements.

"Despite all the trade excitement about air conditioning and your probable feeling that it is a living issue with the public, I do not believe that the public at large really knows what air conditioning is. A large proportion of them *think* they do, but I'm willing to wager that if the Inquiring Reporter stood at the South Station and asked people all day for complete, accurate definitions of air conditioning, you would not get two per cent of answers that would satisfy you.

"My first point is that it will take a tremendous amount of education to put over the definition of air conditioning alone. If people think you cool air they're wrong. If they think you humidify air they're wrong. If they think you circulate air, they're wrong again. If you don't give the crowd an adequate definition of what you do they'll never catch on. But you'll have to give it to them in primer form and over and over again thousands of times before they will catch on. And any manufacturer who is overstressing any one of the functions of his equipment at the expense of the rest will put the lesson out of balance.

"If your equipment only humidifies, don't call it an air conditioner. If it only circulates, don't call it an air conditioner. Stick to the strict facts about your merchandise. Don't claim for it anything it won't do. Slow down your claims to keep time with the facts. Otherwise you only undermine confidence in your industry and your own merchandise.

"The greatest claim to public acceptance which air conditioning has, it seems to me, is the claim of its health benefits. But remember this —these are preventive, not curative benefits. Not only are you dealing with a preventive device, but you are dealing with one which is extraordinarily hard to demonstrate. Advantages of the car over the horse were obvious. My wife long ago tossed out the carpet sweeper for a vacuum cleaner, but it is difficult for her and for me to sense the advantages of an air conditioning apparatus.

"We have to take it for granted to a large extent that it will keep us healthier, and thus cut down the discomfort and expense of illness; that it will reflect its value in the greater life of our rugs, bookbindings, furniture, etc. But we can't throw a bag into it and ride to New York. We can't see it use less coal or oil. We can't turn it on and get Ed Wynn.

"My wife and I, and others of your potential market, could be sold air conditioning equipment if we knew exactly what it is, and what it is not, and if we could be given a demonstration. To get this ball rolling for air conditioning, it strikes me that you will have to sample the public before you can sell them any quantity of high-cost installations. If engineering skill and ingenuity could put out a popular-priced air conditioning unit that would meet your full definition and demonstrate its health benefits obviously and cheaply, I believe that the air conditioning industry would begin to find the ice going out.

"First, frame a definition of air conditioning that is simple and accurate. Let no one advertise his equipment as air conditioning unless it measures up to the definition as a whole. Second, engage in a heavy campaign of public education which will make people want the benefits of air conditioning more than the benefits of a new car or a radio or a fur coat. Third, if possible, produce a low-priced unit that lives up to your definition in toto, that carries no heavy installation costs, and that enables John Public to sample air conditioning the way he sampled automobiles, radio, and so many other items now in general use. If you can produce first and third, the advertising business stands ready to undertake the second. The market is there for you, just as it was for cars, refrigerators, oil burners, and the rest."

Mr. Calhoun took a different slant on the same problem, of promotion of air conditioning, from the standpoint of a successful sales promoter, although in some respects his remarks agreed with those of the previous speaker, such as the assertion that the public lacks general knowledge and acceptance of air conditioning so far. But,

"The trouble with air conditioning is that there are too many engineers connected with it with bolts, nuts, and rivets on their brains and not enough salesmanship. The problem in air conditioning is to make sales and not burden the consumer with figures about cubic content, tons of compression, B t.u., etc.

"The problem in selling air conditioning is like mining, and similarly is divided into three parts: prospecting, drilling, and pay-off. Prospecting is the biggest job of the three. In drilling the right men are needed to follow up the prospects. The pay-off should have such a set-up that a company can make money. Air conditioning men should get together and pool their money in advertising for the good of the industry. There have been too many hit-and-run campaigns in advertising and promotion. In other words, the manufacturers do not stay with the game long enough to achieve results. There are too many heads and not enough advertising campaigns.

"Equip your sales department with more sales organization and less specification data. Bear down on your home office for convincing sales literature. First sell the prospect the idea before selling the unit. It is fundamental to buy on style trend and appeal. During the recent western dust storms the air conditioned trains went through them with perfect comfort for the passengers. This is an argument that should be used for big publicity.

"Orders don't necessarily mean profit. The path of industry is strewn with men who went out and got orders, but never realized any profit. Prices must cover not only costs of production, selling, but a substantial profit."

Howard Parks, of the Parks-Cramer Company, was appointed by the chair to fill out the unexpired term as director of the late Bowen Tufts.

Addington Opens Office

SALT LAKE CITY—H. M. Addington announces that he has opened an office as consulting engineer at 136 East South Temple, this city. Mr. Addington is prepared to handle mechanical equipment of buildings including heating, ventilation, air conditioning, plumbing, and electrical work.

Utility Men Complete A.C. Course

NEWARK—Sixteen Public Service of New Jersey men enrolled from various offices and departments for the Rutgers course in air conditioning recently held their last class session. This group has met weekly since last fall in the Public Service Terminal Building here under the leadership of H. Preston Morehouse, general air conditioning representative of the utility.

A.C. Show for New York

NEW YORK—An air conditioning exposition will be held here June 10-15, in the Port of New York Authority Building. It will be under the direction of Charles Wendell.

Dustop Organization Holds Sales Conference

TOLEDO — The annual sales meeting for the industrial materials division of the Owens-Illinois Glass Company was held March 6-8 at Toledo and Newark, Ohio. This division of Owens-Illinois, created in 1932, has handled the sales and production of the Dustop replacement type air filters for the domestic warm-air furnace field and for installation in ventilating systems of industrial and commercial buildings.

Attending the conference held in Toledo were the zone sales managers, the Toledo organization, and members of the factory personnel. Problems of sales and merchandising were discussed. On the third day of the conference, the group traveled to Newark, Ohio, to make a tour of inspection through the plant. Jan S. Irvine, sales manager of the division, declared the 1935 conference to be the most successful one yet held.

M-H Men Meet in Boston

BOSTON — A two-day conference of dealers in Minneapolis-Honeywell Regulator Company and Brown Instrument Company products, which was attended by 75 persons, including distributors, sales and service men, was held at the Hotel Statler March 18-19. This is the second annual series of regional conferences, when officers are visiting the important branches in the United States and Canada. Operations at the factory and of the research departments were described and illustrated by slides and sound pictures.

The following officials made addresses at the various morning and afternoon sessions, which were arranged by William J. Hajek, New England manager:

H. W. Sweatt, president and general manager, Minneapolis-Honeywell; C. B. Sweatt, vice-president in charge of sales; W. L. Huff, vice-president and treasurer; George D. Kingsland and J. W. Pauling, vice-presidents; George B. Benton, advertising manager; R. L. Goetzenberger, manager process division; S. C. Shipley, chief engineer; F. S. Denison, consulting engineer; Addison Lewis of Addison Lewis & Associates, advertising agency for Honeywell and Brown; R. P. Brown, president, Brown Instrument Company; L. Morton Morley, vice-president in charge of sales, Brown Company.

A.C. in Chapel

PHILADELPHIA — One of the few, if not the only, air conditioned Catholic chapels in the country is that of the Church of St. John the Evangelist, at Thirteenth Street below Market in this city. There is an air conditioning unit on the ceiling over each of the four confessionals.

Members of the sales organization of the industrial materials division of Owens-Illinois Glass Company. Standing, left to right: R. C. Dobson, Bryan Warman, Robert R. Clegg, Charles H. Soderberg, Art D. Soborsky, Joe Ruzylo, F. W. McPeek, H. V. Smith, P. V. Hahn, Bill Dias. Seated, left to right: Ivan S. Rustad, Jack L. Elwood, Jan S. Irvine, Allen Simison, and Frank Myers.

NOBDA Moves; Announces New Policy

NEW YORK—The National Oil Burner Dealers Association general headquarters is now located at 1440 Broadway, New York, where activities in behalf of the retail outlets selling oil burners will be actively continued.

Manufacturers of oil burners have promised their cooperation in the collection of 50 cents per burner from dealer members in their organizations, and through this method of financing the board of directors of NOBDA expect to be able to carry on activities to the general benefit of the industry, entirely supported financially by dealers.

In announcing the new policy of the association the officers and directors are solicitous of the support and cooperation of every manufacturer of oil-burning equipment in the United States on its activities.

$450 Million Appropriated for Housing

(Concluded from page 47)

out the United States, provided, however, that whenever permanent buildings for the use of any department of the Government are to be constructed by funds appropriated by the Act, the provisions of the Act of March 3, 1931 shall apply, but the rates of wages shall be determined in advance of any bidding thereon.

Wherever practicable in the carrying out of the provisions of this Act, full advantage shall be taken of the facilities of private enterprise.

No part of the funds appropriated by the Act shall be expended for the administrative expenses of any department, bureau, board, commission, or independent agency of the Government if such administrative expenses are ordinarily financed from annual appropriations, unless additional work is imposed thereupon by reason of this Act.

P.W.A. Continued Until 1937

The Federal Emergency Administration of Public Works, established under Title II of NIRA is continued until June 30, 1937, and is authorized to perform such of its functions under that Act, and such functions under this Act as may be authorized by the President. All sums appropriated to carry out the purposes of the Public Works Act (Title II of NIRA) shall be available until June 30, 1937. The President is authorized to sell any securities acquired under the Public Works Act, or under this Act, and all moneys realized from such sales shall be available to the President, in addition to the sums heretofore appropriated under this Act, for the making of further loans under the Public Works Act or under this Act.

WITH THE MANUFACTURERS . . . .

AMERICAN DISTRICT STEAM CO., North Tonawanda, N. Y., has appointed the U. S. Supply Co., Omaha, Nebr., as its exclusive sales agent for Nebraska, western Iowa, and northeastern Wyoming.

AMERICAN RADIATOR CO., Allied Products Div., New York, announces that a spring and summer campaign to enable the contractor to gain entrée to a home and sell modern heating has been started in connection with the Arco boiler furnace cleaner, a product of Arco Vacuum Corporation, a subsidiary. Special mailing pieces, form letters, and mats for newspaper advertisements are furnished to the contractor to be used in gaining business with one of the cleaners, as the means of establishing a contact that will lead to repair and replacement work.

Eight methods through which cleaning business can be obtained are listed by the company. They are: (1) by establishing contacts through coal dealers, oil dealers, and gas companies; (2) through mail solicitation; (3) through telephone solicitation; (4) by door-to-door distribution of circulars; (5) through house-to-house canvasses carried out on a commission basis; (6) by offering an annual inspection service at a stipulated fee; (7) through newspaper advertising; (8) through the use of window and truck displays.

Another phase of the policy calls for the development of a program under which accessories and special heating products made by the company will be used in conjunction with its staple boiler and radiator products. This, according to R. F. L'Hote, manager of the division, will enable the contractor to place the responsibility for the quality of the preponderance of his materials directly on one company.

BELL AND GOSSETT CO., Chicago, announces an enlargement of its sales and service organization. J. H. Hanley, with headquarters at 1718 East 26th St., Brooklyn, will have charge of the New York territory. John A. Ivester, at 82 Bristol Road, Medford, Mass., will handle the line in New England. He was with the W. D. Cashin Company for 12 years. Philadelphia and surrounding territory will be serviced by Peter B. Wolff, brought from the home office in Chicago.

CARRIER CORP., Newark, N. J., at its annual meeting of stockholders, March 26, considered and approved an amendment to the certificate of incorporation providing for an increase in the authorized number of shares of common stock of no par value from 500,000 to 1,000,000 shares. The stockholders elected two new directors, E. C. Wampler, Chicago, and Paul Stamm, New York. Other directors were reelected.

Carrier and its subsidiaries, in its financial statement for 1934, report an increase in accepted contracts of 55% over 1933. The current ratio of assets to liabilities was increased from 2.5 to 5.3. An operating profit of $32,-811.73 for the year 1934 becomes, after inclusion of depreciation charges and non-operating profit, a net loss of $86,-582.86 against a net loss for 1933 of $673,616.85.

CARRIER CORP., Newark, N. J., announces unfilled orders on its books at the end of the first quarter amounting to nearly $3 million. Sales of equipment to dealers by Carrier Engineering Corporation, a subsidiary, showed a gain of 173% over the first quarter last year. In the same period direct contract installations increased 45%. In the export and overseas business Carrier Brunswick International Corporation showed an increase of 88% for the quarter.

CRANE CO., Chicago, has appointed A. W. Sperry as assistant manager of the San Francisco branch, with headquarters at the general offices and warehouse, 301 Brannan Street. Mr. Sperry was formerly in charge of the Crane exhibit rooms at 61 New Montgomery St. His former assistant in the exhibit rooms, Joseph C. Granville, has been appointed exhibit room manager.

CRANE CO., Chicago, is now headed by C. B. Nolte, for six years president of R. W. Hunt & Company. The new president succeeds John W. Berryman, who was elected chairman of the board of directors. The changes were made at a meeting of the board on March 26. The board of directors was reduced from 13 to nine members and now consists of John W. Berryman; A. F. Gartz, Jr.; Cornelius Crane; P. T. Kelly, vice-president; Dr. F. R. Lillie; M. W. Lowell; C. B. Nolte; E. A. Russell, and C. A. G. Wayman, vice-president.

FEDDERS MANUFACTURING CO., Buffalo, N. Y., has appointed Emerson Swan Goodyer Co., 110 Arlington St., Boston, as New England representative to handle its line of unit heaters.

FRIGIDAIRE CORP., Dayton, announces that sales volume of its air conditioning division was 302% higher for February in comparison with February a year ago. This increase maintains the trend that has been evident since December 1, sales volume in December and January having been 300% over the same 60-day period a year ago.

NATIONAL RADIATOR CORP., Johnstown, Pa., has appointed Charles P. Culbert manager of its oil heating division.

Mr. Culbert, prior to his present appointment, was factory manager of Gilbert & Barker Manufacturing Company's branch in metropolitan New York. Before that, he was with Electrol as assistant sales manager, and later as president and general manager of Electrol of Westchester, Inc.

In his new position Mr. Culbert will supervise the merchandising of that company's various oil-burning boilers, including a new line of steel boiler-burner units now being introduced by the compay.

NEW YORK BELTING & PACKING CO., Passaic, N. J., has appointed Harry H. Raber assistant to the general manager with headquarters at the company's main office. J. W. Webster has been transferred from the middle Atlantic states to the territory comprised of Tennessee, Alabama, Florida, and Georgia. Donald F. Potter has been added to the sales force, as have John V. Lanahan and O. L. Wall.

THE OHIO ELECTRIC MFG. CO., Cleveland, has made K. I. Clisby, 74 Trinity Place, New York, a vice-president.

PENN ELECTRIC SWITCH CO., Des Moines, Ia., has appointed A. Y. McDonald Mfg. Co., main office, Dubuque, Ia., as distributor for its complete line of controls and switches in the middle west. Warehouse stocks will be carried at all branches, Kansas City, Mo., Hutchinson, Kan., Grand Island and Omaha, Nebr., Minneapolis, Minn., Des Moines and Sioux City, Ia., and at headquarters in Dubuque.

E. B. Maire, sales engineer for Penn Electric, has been transferred from Des Moines to the Chicago office of the company.

Joe Linfor, another sales engineer, has been assigned to the Detroit office.

READING IRON CO., Reading, Pa., has appointed S. H. Blackwood, formerly assistant district sales representative in the New York territory, as district sales representative in the southern territory with headquarters at 1104 Continental Bldg., Baltimore. Mr. Blackwood takes the position held for many years by W. J. White, who recently resigned. W. N. Johnson has been appointed as salesman in the New York territory.

REPUBLIC STEEL CORP., Youngstown, Ohio, announces that effective April 1, the Seattle, Wash., district sales office will be removed to the White-Henry-Stuart Building. C. D. Winter continues in charge of the office as district sales manager, assisted by his present staff to which will be added Archie Rider, recently transferred from the Youngstown office.

REPUBLIC STEEL CORP., Youngstown, Ohio, has moved its New York district sales office to the Chrysler Building. W. H. Oliver continues in charge of the office as district sales manager.

H. A. THRUSH & CO., Peru, Ind., has appointed Henry C. Johnson and his associate, Charles A. Kolstad, of Rochester, N. Y., as representatives to cover northern New York, northwestern Pennsylvania, and Erie, Pa.

This company has also appointed

Railway & Engineering Specialties, Ltd., as Canadian representative with offices at Montreal, Toronto, and Winnipeg.

H. A. THRUSH & Co., Peru, Ind., has appointed Myers Engineering & Equipment Co., 3947 West Pine Blvd., St. Louis, to cover the St. Louis portion of southern Illinois, and the eastern portion of Missouri as direct sales representative.

UNITED AIR CONDITIONING CORP., Chrysler Building, New York, distributor of Airtemp air conditioning equipment, has appointed J. R. McDonald vice-president in charge of sales. Mr. McDonald has had a wide experience in sales and manufacturing, and recently served as director of promotion and public education of the Citizens' Budget Commission, New York. He was also at one time connected with a New York brokerage firm. Lawrence P. Brady, appointed vice-president in charge of engineering of the firm, has had seven years' experience in the field of air conditioning and refrigeration. A graduate of the University of Detroit, he has been previously connected with the Copeland Products Corporation, the Universal Cooler Corporation, and has engaged in engineering research work in air conditioning development.

JOHN WALDRON CORP., New Brunswick, N. J., has appointed F. W. Thomas, for the last 10 years New York district manager of the coupling division of the Bartlett Hayward Company, as general manager of sales of the Francke coupling and Silent Gear department.

As of July 15 the sales staff of John Waldron Corporation will handle the sale of its products directly in place of through Smith & Serrell of Newark, N. J., who have functioned as general sales agents heretofore.

YORK ICE MACHINERY CORP., York, Pa., has opened a sales office in Chicago to specialize in air conditioning. The office was established to supplement the sales activities of Westerlin & Campbell Company, York sales agent in the middle west. Located in the Conway Building, the organization is in charge of Maurice Hitchen. Its territory includes Michigan, Wisconsin, Minnesota, North Dakota, Indiana, and northern Illinois.

Mr. Hitchen was formerly connected with B. F. Sturtevant Company as branch manager. When Cooling & Air Conditioning Corporation was formed Mr. Hitchen was named president and general manager, a position he held until his resignation to form the Hitchen Engineering Company which has quarters with York's new Chicago office.

Assisting Mr. Hitchen as supervisor of sales estimating, sales planning, and preparation of proposals and layouts, will be M. M. Lawler, formerly with Drying Systems, Inc., and also Cooling & Air Conditioning Corporation. F. C. Wood and J. J. Floreth, sales engineers of the Westerlin & Campbell Company, and Harvey G. Chapin complete the organization.

YOUNG RADIATOR CO., Racine, Wis., has added to its staff, effective March 1, Edward S. Erickson, formerly vice-president in charge of production and research at Mullins Manufacturing Co., Salem, Ohio.

COMING EVENTS

MAY 20-22, 1935. *Annual convention of the Heating, Piping and Air Conditioning Contractors National Association, Hotel Gibson, Cincinnati, Ohio.*

MAY 22-24, 1935. *Twenty-Second Annual Spring Convention of the American Society of Refrigerating Engineers, Hotel Statler, Detroit, Mich.*

JUNE 4-6, 1935. *Mid-Year Convention of the National Warm Air Heating and Air Conditioning Association, Deshler-Wallick Hotel, Columbus, Ohio.*

JUNE 10-15, 1935. *Air Conditioning Exposition to be held in the Port of New York Authority Building, New York, N. Y.*

JUNE 11-14, 1935. *Annual Convention of the National District Heating Association, Bellevue-Stratford Hotel, Philadelphia, Pa.*

JUNE 17-19, 1935. *Semi-Annual Meeting of the American Society of Heating and Ventilating Engineers, Royal York Hotel, Toronto, Canada.*

JUNE 19-21, 1935. *Semi-Annual Meeting of the American Society of Mechanical Engineers, Cincinnati, Ohio.*

JUNE 25-27, 1935. *Fifty-Third Annual Convention of the National Association of Master Plumbers, Stevens Hotel, Chicago, Ill.*

OCTOBER 14-18, 1935. *Seventeenth Annual Convention of the American Gas Association, Atlantic City, N. J.*

JANUARY 27-31, 1936. *Fourth International Heating and Ventilating Exposition, International Amphitheatre, Chicago, Ill.*

Thomas B. Cryer

NEWARK, N. J.—Thomas Blackburn Cryer, president of T. B. Cryer Company, died March 27. He was 71 years old and had been ill for several months. His widow, two sons, a sister, and two brothers survive.

Born in London, Ont., Mr. Cryer came here 45 years ago and entered the heating business with his father. He was a member of the code authority for the heating, piping and air conditioning industry for Essex and Morris Counties. He was president of the Masonic Building and Loan Association of Newark.

Stewart A. Jellett

PHILADELPHIA—Stewart A. Jellett, nationally known pioneer heating and ventilating contractor and engineer, died here April 5 after a lingering illness. He was 73.

Mr. Jellett in 1879, at the age of 17, was apprenticed to learn the trade of engine turning. After completion of his trade, he served two years as assistant foreman. As draftsman and engineer with the Philadelphia Exhaust Ventilator Company, Mr. Jellett designed and supervised the construction of drying systems. After two years he became a partner in the business.

At this period of his career, Mr. Jellett designed the complete mechanical ventilation equipment for the U. S. Navy cruiser *Yorktown*. The Drexel Building in Philadelphia, built in 1887, was heated with a downfeed system of exhaust steam radiator supply piping, one of the first of its kind, and which he designed.

From 1889-1912 Mr. Jellett was successively engineer, manager, vice-president, and treasurer for Francis Bros. & Jellett, Inc. From 1912 until his death he was president of the Stewart A. Jellett Company.

He was an active member of the Heating, Piping and Air Conditioning Contractors National Association, and served as director in 1900, president in 1901, and chairman of the board of directors in 1902 and 1903. He was a charter member, presidential member, and honorary member of the A.S.H.V.E., having been president in 1895, secretary in 1898, chairman of the board of managers in 1899, and member of the board of managers from 1895 to 1899.

He is survived by his wife, three sons, and daughter.

Samuel B. Waters

JOHNSTOWN, PA.—Samuel B. Waters, vice-president of National Radiator Corporation, died March 20 at his home after an illness of six weeks.

Mr. Waters was for many years associated in business with his brother, the late John H. Waters. Together, they developed the original National Radiator Company from a small local concern to a large organization. He continued to take an active part in the affairs of the corporation until ill health forced his virtual retirement several years ago. In addition to his affiliation with National Radiator Mr. Waters was one of the founders of the Century Stove & Manufacturing Company of Johnstown.

He was a member of Johnstown Lodge, No. 538, Free and Accepted Masons, since 1888, and was knighted by Oriental Commandery, No. 61, Knights Templar, in February, 1890, and later served as eminent commander of the commandery.

BETTER · HOUSING · PROGRAM

- **no down payment**
- **no PAYMENTS UNTIL FALL**
- **no interest charges during summer**
- **up to 3 years to pay**
- **on FHA LOW RATES**

By absorbing the interest charges for the summer period, American Radiator Company makes it possible for you to do a profitable summer business selling American Radiator Heating on the most liberal terms ever offered.

You can offer summer installations—*no down payment* — no payments until fall — at no interest charges during the summer to you or your customers — with as long as 3 years to pay on FHA terms.

You get your cash immediately — your customer pays nothing until fall — no interest charges during the summer.

Use this new financing plan to get immediate business. Point out the advantages of having the work done in summer, while the family is on vacation. Explain the importance of avoiding the rush season in the fall.

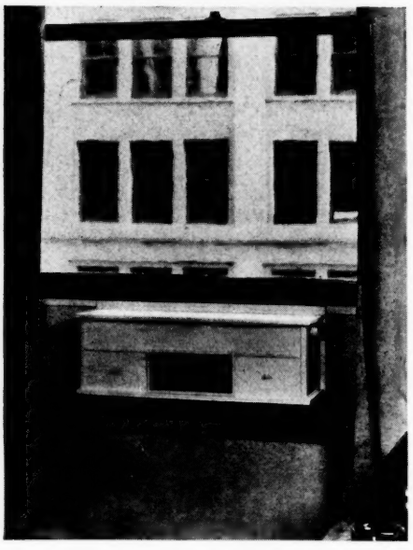
Remind prospects that they can be certain of present low prices by acting now. Every time-payment sale on this plan means immediate cash to you. No holdbacks — no collection fees — no extra charges of any kind.

Write for details of special summer plan!

AMERICAN RADIATOR COMPANY

40 West 40th Street, New York, N. Y.

NEW EQUIPMENT



Davies window-type filter

Davies Filteraire

Filteraire is a window-type filter recently placed on the market by Davies Air Filter Corp., 390 Fourth Ave., New York. These are available in two models. Model H-H, illustrated, has a blower of large capacity, an Airplex filter and a silencer. It delivers 450 c.f.m. It is 26 in. wide, 9 in. high, and projects 7 in. into the room from the window sash.

Model C is said to have an entirely new type blower which produces no fluttering air noises. It uses the same filter as model H-H and delivers 350 c.f.m. It is 23 in. wide, 13½ in. high, and 10 in. deep.

Empire Ideal Gas Boiler

American Gas Products Corp., Div. of American Radiator Co., 40 West 40th St., New York, has placed on the market the type 2-GA Empire Ideal gas boiler. It is a unit of modern appearance with the boiler and controls, excepting the gas governor, enclosed within a baked enamel metal finish jacket, set off with a chromium plated enamel nameplate and thermometer or pressure gauge.

Empire Ideal gas boiler

The boiler includes essentially the same basic sections and control equipment as heretofore used in standard Ideal gas boilers. The main gas control valve has been improved and simplified and the entire control is centered in one valve. This includes manual shut off, thermostatic pilot, water temperature or steam pressure throttling control of the gas, water temperature or steam pressure limit control of the gas supply and thermostatic pilot.

Standard equipment with all boilers includes the insulated enameled jacket, vitreous enameled draft diverter, thermostatic pilot, throttling and limit control, and all steam boilers include a resetting low water cut-off. Standard accessories are available so that the boiler may be controlled by any of the standard types of room thermostats.

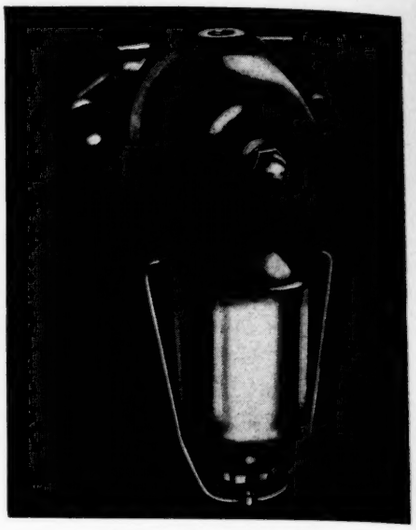
The boilers are rated from 210 to 2560 sq. ft. of hot water radiator, and from 270 to 1600 sq. ft. of steam radiator.

Jefferson Transformer

A small transformer for use with domestic oil burners has been announced by Jefferson Electric Co., Bellwood, Ill. This transformer is an addition to the company's line. Smaller size is achieved by eliminating the junction box. Positive grip snap connectors are used, and the well-type porcelain seconary bushings are extra deep, providing a higher degree of protection. The capacity is standard — 10,000 volts and 12,000 volts — although the case is much smaller. It is drawn in one piece, streamlined, and finished in either smooth or crackled art lacquer.

Sundstrand Rota-Roll

Sundstrand Machine Tool Co., Rockford, Ill., has placed on the market the Sundstrand Rota-Roll automatic fuel unit No. 7-OB, a single stage pump which it is claimed will supply constant pressure at the burner nozzle regardless of small leaks or restrictions in the suction line. A quick, positive cut-off of oil flow when motor ceases is said to be a feature of the unit. The unit has a pressure range of 90 to 150 lb. per sq. ft. It has a capacity of 22 gal. per hr. at 1725 r.p.m., and 15 gal. per hr. at 1150 r.p.m.

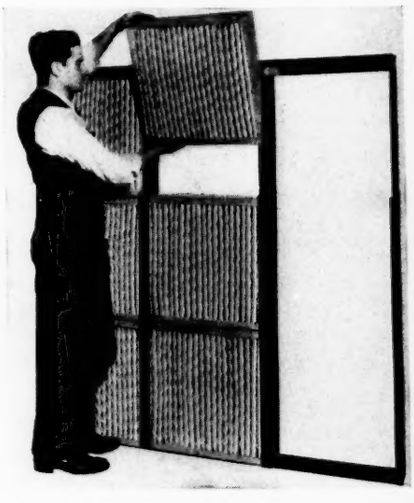


Sundstrand Rota-Roll

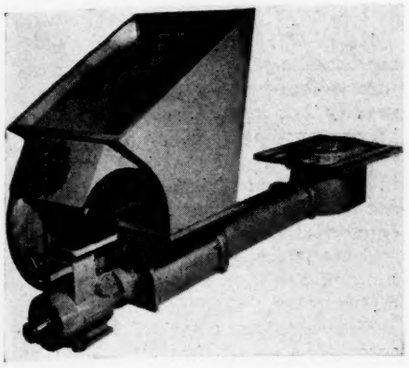
Davies Group Filter Frame

Davies Air Filter Corp., 390 Fourth Ave, New York, has announced a group filter frame built without cross pieces, the filters furnishing their own cell and support. The frames are built up in sections containing from two to 25 cells. Large installations are taken care of by using a number of group frames.

The cell is fed in at the top and pushed down in the U-shaped frames; the last one is held in position by means of a simple compression catch. Each filter cell has one layer of cotton wadding on the bottom edge so that when it rests on another filter cell it forms a tight joint.



Inserting filter in the Davies group filter frame



Bardes stoker

Bardes Stokers

The Bardes Stoker Works, 2619 Colerain Ave., Cincinnati, is marketing a line of automatic stokers for residences and commercial buildings. They are made in nine sizes with capacities up to 250 boiler hp.

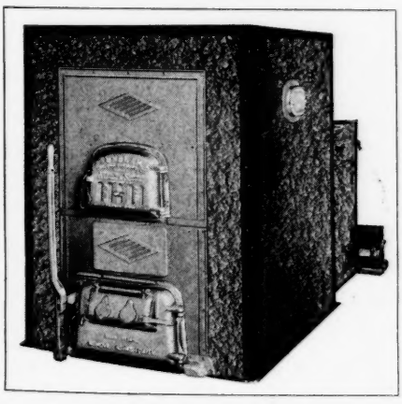
The motor and fan are located above the driving unit with the motor direct-connected to the fan. The motor fan unit runs independently of the screw conveyor so that in case of accident to the coal or gears the fan can continue to run. The fan is of a multivane type while the drive is V-belt. The screw conveyor is made in one piece of alloy steel.

The driving unit is of the continuous V-type and the speeds can be changed while the motor is off or while operating under full load by moving a lever. Gears and pinions are of stub tooth design.

Sunbeam Square Cased Furnaces

The Fox Furnace Co., Elyria, Ohio, has announced that its line of Sunbeam gravity furnaces is now available with square casings. Casings of galvanized iron, or in red and black crystalline baked enamel, are obtainable.

Inside of the square exterior casing is a round inner casing within which all the circulating air passes. It is claimed that with this double casing construction the circulating air will be heated uniformly and, consequently, that all runs leading from the furnace will receive air of the same temperature.



Fox square jacketed furnace

Thrush Pressure Relief Valve

H. A. Thrush & Co., Peru, Ind., has announced the No. 75 valve, furnished in ½ in. and ¾ in. sizes. This is an angle type, high-pressure relief valve, diaphragm and spring actuated.

In the top is a fairly large opening to make the spring visible and to provide a means for testing the valve without running up pressure on the job, and as a safe means for testing the valve. The valve is tested, approved, and listed as standard by the Underwriters Laboratories and is in compliance with the A.S.M.E. boiler code. It can also be furnished in either size with a fusible plug which will provide a satisfactory and reliable temperature and pressure relief valve.

Westinghouse Commercial Condensing Units

A new line of open type commercial condensing units, available in three suction-pressure ranges, is announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The units are divided into low, standard, and high suction-pressure classifications, as designated by the last letter in the model number, L, S, and H, respectively.

The low suction pressure range unit extends from 31° below zero to 5° above zero. The standard range is from 13.5° below to 20° above, while the high range is from 10.5° to 40°. This range of suction pressures may be had in all 1 hp. and 1½-hp. models and standard and high suction ranges are obtainable in 2 hp. and 3 hp. models.

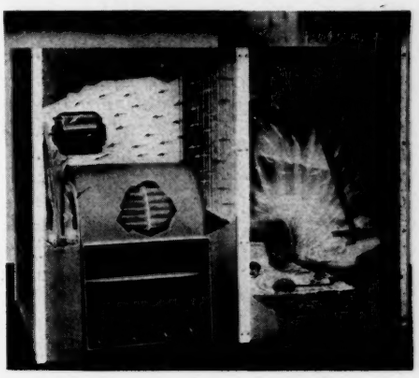
All air-cooled units are equipped with large shrouded condensers. Suction and discharge valves are contained in the head of the compressor.

Century Boiler-Burner Units

Century Engineering Corp., Cedar Rapids, Ia., has announced the addition of two sizes to the company's line of boiler-burner units. The new units have a capacity of 700 and 1200 sq. ft. of steam radiator.

Spraywheel Air Conditioner

Spraywheel Air Conditioners, Inc., 1226 California St., Denver, is marketing in that city its spraywheel unit. The spray wheel rotates in a tank full of water. However, the wheel is not dipped into the water but the water is fed to the inside of a hollow rimmed wheel and as the wheel rotates freely in the trough the water is spun out radially, filling the complete spray chamber. This, it is claimed, requires considerably less power than a pump-operated spray. The water is replenished by means of an adjustable ball float and suitable valve.



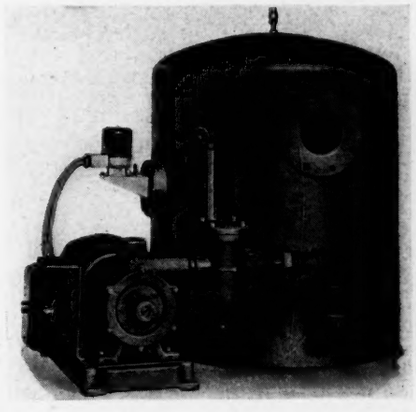
Spraywheel air conditioner

Although primarily a humidifier the unit is used for cooling in dry climates, such as Denver, where cooling can be accomplished by evaporation. The unit costs $295 plus installation.

Roots-Connersville Condensate Units

Roots-Connersville Blower Corp., Connersville, Ind., is marketing a line of condensate units, intended for heating systems and boiler feed service. They are built in a range of sizes from 2,000 to 70,000 sq. ft. of radiator.

The type T pump incorporated in this design has a high vacuum lift which, it is claimed, enables the units to handle a considerable percentage of air or vapor along with liquids, and prevents them from becoming air-bound in condensate return or boiler feed service. Standard pumps are used with the addition of an extra sealing gland on shaft. Seals are capable of withstanding temperatures up to 450°, according to the manufacturers.



Roots-Connersville condensate unit

Weather Forecaster

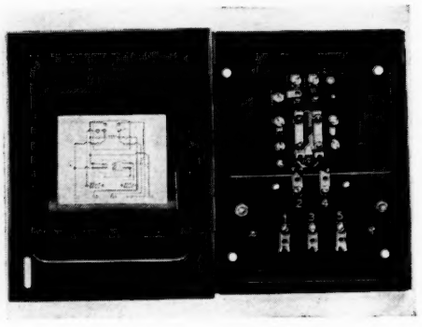
C. S. Hammond & Co., Inc., 360 Furman St., Brooklyn, N. Y., is marketing the Curry weather forecaster, a pocket-size precision instrument. It consists of the hygrometer, a chemical material which indicates the degree of moisture of the air by change of color.

Each color grade corresponds to a change of about 20% in the degree of moisture of the air. Of the five comparison colors, blue, for instance, corresponds to an atmospheric degree of humidity of 0—20% and light pink to 80—100%. A compass is provided, by means of which the cardinal points and hence the direction of the wind may be ascertained. Great humidity of the air, as a rule, brings rain, snow, or fog; slight humidity, on the other hand, fine, dry weather. As, however, the degree of humidity in its effect upon the weather has to be estimated differently, according to the direction of the wind, this factor has also been included for determining the weather.

The changeable indicator is affected some 8 to 15 hr. before a change in the weather sets in. The instrument bases its weather prediction on two factors, the atmospheric moisture and the direction of the wind.

Instructions for using consist of following four directions as follows: (1) Turn the knob to bring together the corect color segment and the changeable indicator; (2) Determine the direction from which the wind is coming by observing movement of the clouds, smoke, weathervane, etc. Use the compass, if necessary, to determine the inter-cardinal point nearest that direction. (3) Keep the matching colors together and turn knob slightly until correct wind direction appears in small window below indicator. (4) The weather forecast may then be read in window on left of instrument. Instead of "rain," read "snow" in winter and "fog" in autumn or spring.

Curry weather forecaster



Edison relay

Edison Timing Relay

Edison Electrical Controls Division of Thomas A. Edison, Inc., Orange, N. J., has developed a time relay which is claimed to be accurate and will operate consistently through a long life under extreme conditions without the necessity for servicing.

It is composed essentially of an Edison type R-4 thermal relay which operates a magnetic contactor. The thermal relay may be calibrated to operate with a delay of a few seconds or several minutes. This device is sealed in a glass tube from which air has been exhausted.

The thermal relay is mounted with the magnetic contactor in a standard switch box. The assembly is wired to an accessible terminal board. The magnetic contactor is provided with a spare set of contacts so that the unit may be used for sequence closing of two or more circuits. The timing relay is available for use on d.c. as well as a.c.

This relay is ideally suited for starting compressors in sequence in air conditioning. In many installations several compressors are used for across-the-line starters and because of the large inrush current, the demand load would be very heavy. Allowing 20 to 30 sec. time between the starting of each compressor accordingly reduces the cost of current, which is the biggest single running expense on an automatic installation.

In addition to effecting this economy in operating expense, the relay, through the reduction in starting current, often makes possible the use of existing wiring in the building where the installation is made.

Fireline Plastic Refractory

The Fireline Stove & Furnace Lining Co., 1856 Kingsbury St., Chicago, announces a plastic refractory material, to be sold under the name of Fireline, for lining firepots. It comes in plastic form, and is said to make firepots gas-tight, to resist shock and erosion, and to be non-cracking. It comes in 2½-, 5-, 10-, 50- and 100-lb. cans and is applied from 1 to 2 in. thick over firepot wall from grates to fuel line.

Thrush Orifice Inserts

H. A. Thrush & Co., Peru, Ind., is merchandising a line of Thrush orifice inserts for use in old, large-sized pipe, gravity hot water systems which are being converted to forced circulating systems. The orifices retard circulation in points where this is desirable. They are made of soft brass and fit the union connections of radiator valves or ells, and are made in three sizes—1 in., 1¼ in., and 1½ in., to fit any make of radiator valve.

The inserts are packed 25 in a box, assorted, with twelve 1-in., eight 1¼-in., and five 1½-in. inserts.

Royal Booster Gas Heater

The Premier Heater Div., Crane Co., La Porte, Ind., has announced the Royal Booster gas water heater, a heavy duty unit for requirements up to 140 gal. per hr. It is designed particularly for apartments, office buildings, hotels, and factories.

Its construction is such that there are three distinct types of heating surface—main combustion chamber, five individual flues, and a heating dome.

Owens-Illinois Improved Dustop Filter

The Industrial Materials Div., Owens-Illinois Glass Co., Toledo, Ohio, announces an improved Dustop replacement type air filter to be placed on the market immediately. The improved filter is fire-resistant, lower in resistance, higher in efficiency, and the life has been materially increased.

It is made up of a series of coarse and fine mats of glass fibers which are bonded to each other to form a semi-rigid mat. The fibers in these mats are laid down by machine.

The adhesive has a surface tension four times that of engine oil, so that there is no oil vapor entrained in the air stream. The melting point of this adhesive is 540° and is effective to 23° below zero.

Improved Dustop filter

G.E. Condensing Units

Eight new condensing units of from 1½ to 20 hp. and rated at from 1.8 to 21.50 tons of refrigerating capacity have been announced by the air conditioning department of General Electric Co., Schenectady. These units are additions to the present line; three of them, types CM-61S, CM-81W, and CM-81S being equipped with water-cooled, double-tube counterflow condensers, and the others, type CM-81L, two types CM-9L, and two types CM-10L, having new shell-and-tube condenser-receivers.

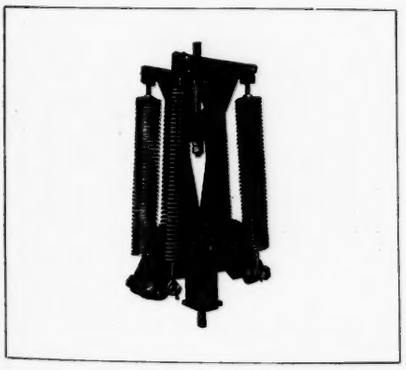
All of the units have external motors with multiple V-belt drive to the compressors, liquid refrigerant filters, suction pressure controls, high-pressure safety lockouts, water regulating valves, service valves, and water and refrigerant connections. Units are shipped with a full charge of lubricating oil and a holding charge of freon. Included with each unit is a magnetic motor starting switch and a thermal overload protector for the motor.

Types CM-61S, CM-81W, and CM-81S, 1½ hp., 3 hp., and 5 hp., respectively, have rated refrigerating capacities of 1.8 tons, 3.60 tons, and 5.70 tons. Type CM-81L, 5 hp., is rated at 5.70 tons. Type CM-9L is available in two sizes: 7½ and 10 hp. with respective rated refrigerating capacities of 8.75 and 11.50 tons. Type CM-10L is also obtainable in two sizes: 15 and 20 hp., rated at 16.50 tons and 21.50 tons.

The outstanding feature of the "L" units is their shell-and-tube condenser-receivers which combine the functions of condenser and liquid receiver. Seamless steel water tubes are used in these units, galvanized against corrosion and providing straight accessible passages for cleaning. The tubes are finned on the refrigerant side. The removable heads give access to the tubes and the condenser assembly is capable of withstanding 2000 lb. per sq. in. pressure.

Grinnell Genspring Pipe Hanger

Grinnell Co., Inc., Providence, R. I., is making the Grinnell Genspring constant-support pipe hanger for supporting pipe lines, with freedom for movement in any direction while affording support throughout the whole range of horizontal and vertical movement. Since movements of the pipe line are not restrained there are no backthrusts. The hangers are made in three frame sizes: No. 1 for light duty; No. 2 for medium duty, and No. 3 for heavy duty.

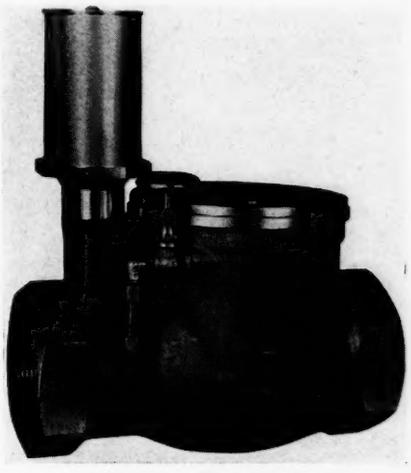


Genspring pipe hanger

Hoppe Solenoid Valves

The Wm. Powell Co., 2521-31 Spring Grove Ave., Cincinnati, has introduced a line of Hoppe electric hydraulic valves for pressures up to 250 lb. The valves are of the solenoid type. The solenoid valve operates the main valve through a bypass arrangement. The valves are submersible and have no packing, gaskets, springs, or levers.

They are available in three types, one for brine water, oil, or air; another for carbon dioxide, sulphur dioxide, or freon, and a third for steam or ammonia. They are obtainable in 10 sizes ranging from ¼ to 3 in.

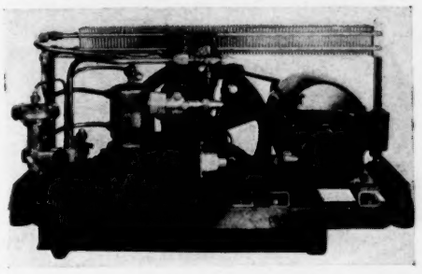


Hoppe solenoid valve

Kelvinator 1935 A. C. Line

Sixty-three units, designed for all types of installation from individual room conditioning to large theater and auditorium jobs, make up the complete air conditioning line of 1935, just announced to its field organization by Kelvinator Corp., Detroit. Seven self-contained cabinet types of air conditioning units for offices, small shops, and residence rooms make their appearance. These have all the mechanism and controls enclosed and come ready to attach to drain, electric, and water supply. Under average conditions these units are suitable for offices and rooms ranging from 160 to 440 sq. ft. in area, with average ceilings 10 ft. in height.

Seven floor-type cabinet models are designed for use when the condensing unit can be located at some remote spot. They are intended primarily for homes,



Typical Kelvinator condensing unit

and can provide complete conditioning to living rooms with average ceilings of 8 ft., and ranging in area from 250 to 660 sq. ft.

Four suspended-type units are equipped with temperature control and designed for installations where ceiling or recess location is desirable. These are adaptable to two-room installations, such as bedrooms, where one suspended unit can be located in a closet or other space between the two rooms. Capacities range from two small bedrooms 12 x 18 x 8 ft. to a small store or shop of 42 x 20 x 12 ft.

For larger air conditioning requirements, the line contains eight additional suspended-type units, four of them equipped with a damper control. They are made to operate from ceiling or recess locations and capacities range from shops of 30 x 20 x 12 ft. to 50 x 30 x 12 ft.

Fifteen evaporator coils for duct installation, ranging in capacity from one to 20 tons, are intended for large installations where the conditioning equipment is located at some central spot and the conditioned air conveyed by ducts to the spaces to be conditioned.

Kelvinator has nine air-cooled and 13 water-cooled condensing units as part of its line, with capacities ranging from 1/3 to 20 hp.

PUBLISHER'S STATEMENT OF CIRCULATION OF

HEATING AND VENTILATING

This is to certify that the average circulation per issue of HEATING AND VENTILATING for the six months' period July 1st to and including December 31st, 1934, was as follows:

Copies sold	4666
Copies distributed free to leading engineering, architectural and contracting firms	1426
Copies distributed free—miscellaneous	583
TOTAL	6675

THE INDUSTRIAL PRESS

(Signed) EDGAR A. BECKER, Treasurer.

Subscribed to and sworn before me on this 6th day of March, 1935.

CHARLES P. ABEL

(SEAL)

Notary Public, Kings County No. 319; Kings Register No. 5120; N. Y. County No. 207; N. Y. Register No. 5-A-128. My Commission Expires March 30, 1935.

Degree-Days and Unit Fuel Consumption—March, 1935

Continuing HEATING AND VENTILATING's seventh year of publishing degree-day data for various large cities in the United States

	Atlanta	Baltimore	Birmingham	Boston	Buffalo	Chicago	Cincinnati	Cleveland
Degree-days for March, 1935	261	484	177	823	889	734	485	679
Degree-days, Sept. 1, '34 to March 31, '35	2604	3839	2171	5405	5670	5096	4046	4815
Degree-days, Sept. 1, '33 to March 31, '34	2665	4367	2148	5781	6424	5470	4630	5503
Degree-days, Sept. 1 to March 31, Normal	2759	4162	2339	4188	5799	5491	4344	5390
Lb. coal per sq. ft. rad., March, 1935....	2.088	3.872	1.416	6.584	7.112	5.872	3.880	5.432
Gal. oil per sq. ft. rad., March, 1935....	0.179	0.332	0.121	0.564	0.610	0.503	0.333	0.466
Cu. ft. gas per sq. ft. rad., March, 1935..	25.06	46.46	16.99	79.01	85.34	70.46	46.56	65.18

	Denver	Des Moines	Detroit	Duluth	El Paso	Fort Wayne	Grand Rapids	Harrisburg
Degree-days for March, 1935	660	723	802	1225	243	691	834	638
Degree-days, Sept. 1, '34 to March 31, '35	4138	5349	5035	7869	2025	5106	5492	4637
Degree-days, Sept. 1, '33 to March 31, '34	3731	5500	6011	8391	1908	5707	6130	5216
Degree-days, Sept. 1 to March 31, Normal	5072	5825	5695	7911	2383	5330	5827	4880
Lb. coal per sq. ft. rad., March, 1935....	5.280	5.784	6 416	9.800	1.944	5.528	6.672	5.104
Gal. oil per sq. ft. rad., March, 1935....	0.453	0.496	0.550	0.840	0 167	0.474	0.572	0.437
Cu. ft. gas per sq. ft. rad., March, 1935..	63.36	69.41	76.99	117.60	23.33	66.34	80.06	61.25

	Hartford	Indianapolis	Kansas City	La Crosse	Los Angeles	Louisville	Memphis	Milwaukee
Degree-days for March, 1935	793	545	437	884	308	388	224	852
Degree-days, Sept. 1, '34 to March 31, '35	5293	4395	4028	6330	1031	3556	2495	5711
Degree-days, Sept. 1, '33 to March 31, '34	5844	5030	4100	6840	778	4082	2766	5989
Degree-days, Sept. 1 to March 31, Normal	5303	4855	4966	6611	1255	3916	2854	6208
Lb. coal per sq. ft. rad., March, 1935....	6 344	4.360	3.496	7.072	2.464	3.104	1.792	6.816
Gal. oil per sq. ft. rad., March, 1935....	0.544	0.374	0.300	0 606	0.211	0.266	0.154	0.584
Cu. ft. gas per sq. ft. rad., March, 1935..	76.13	52.32	41.95	84.86	29.57	37.25	21 50	81.79

	Minneapolis	New Haven	New Orleans	New York	Oklahoma City	Omaha	Peoria	Philadelphia
Degree-days for March, 1935	958	763	53	674	272	641	642	584
Degree-days, Sept. 1, '34 to March 31, '35	6676	5026	929	4567	2760	4934	4921	4152
Degree-days, Sept. 1, '33 to March 31, '34	6906	5566	843	5088	2970	5049	5350	4590
Degree-days, Sept. 1 to March 31, Normal	7045	5129	1023	4707	3451	5633	4535	4385
Lb. coal per sq. ft. rad , March, 1935....	7.664	6.104	0.424	5.392	2.176	5.128	5.136	4.672
Gal. oil per sq ft. rad., March, 1935....	0.657	0 523	0.036	0 462	0.187	0.440	0.440	0.400
Cu. ft. gas per sq. ft. rad., March, 1935..	91.97	73.25	5.09	64.70	26 11	61.54	61.63	56.06

	Pittsburgh	Portland, Ore.	Providence	Reading	Rochester	St. Louis	Salt Lake City	San Francisco
Degree-days for March, 1935	541	652	765	627	849	436	742	385
Degree-days, Sept. 1, '34 to March 31, '35	4357	3386	5202	4561	5614	3730	4515	1907
Degree-days, Sept. 1, '33 to March 31, '34	5174	2842	5691	5039	6297	4136	3673	1676
Degree-days, Sept. 1 to March 31, Normal	4734	3732	5205	4876	5854	4309	4866	2124
Lb. coal per sq. ft. rad., March, 1935....	4.328	5.216	6 120	5.016	6.792	3.488	5.936	3.080
Gal. oil per sq. ft. rad., March, 1935....	0 371	0.447	0 525	0.430	0 582	0.299	0.509	0 264
Cu ft. gas per sq. ft. rad., March, 1935..	51.94	62.59	73.44	60.19	81.50	41.86	71.23	36.96

	Scranton	Seattle	Spokane	Syracuse	Toledo	Trenton	Washington, D. C.	Wichita
Degree-days for March, 1935	793	666	826	849	734	657	464	398
Degree-days, Sept. 1, '34 to March 31, '35	5310	3541	5016	5676	5183	4617	3875	3609
Degree-days, Sept. 1, '33 to March 31, '34	5889	3192	4406	6343	5795	5218	4376	3644
Degree-days, Sept. 1 to March 31, Normal	5445	3932	5485	5984	5368	4450	4253	4421
Lb. coal per sq. ft. rad., March, 1935....	6 344	5.328	6.608	6.792	5.872	5.256	3.712	3.184
Gal. oil per sq ft. rad., March, 1935....	0.544	0.457	0.566	0 582	0.503	0.451	0.318	0.272
Cu ft. gas per sq. ft. rad., March, 1935..	76 13	63 94	79.30	81.50	70 46	63.07	44.54	38.21

Fuel consumption figures given above are based on certain conditions, and for other conditions corrections must be made. The figures assume the use of steam radiators emitting 240 B.t.u. per sq. ft. per hr., a system operating at 100% efficiency, and radiators calculated for maintaining 70° in zero weather. Heating values assumed for the fuels are 12,000 B.t.u. per lb. for coal, 1000 B.t.u. per cu. ft. for gas, and 140,000 B.t.u. per gal. for oil. To correct for other heating values, efficiencies, and design conditions, follow the method explained in the "Heating and Ventilating Degree-Day Handbook."

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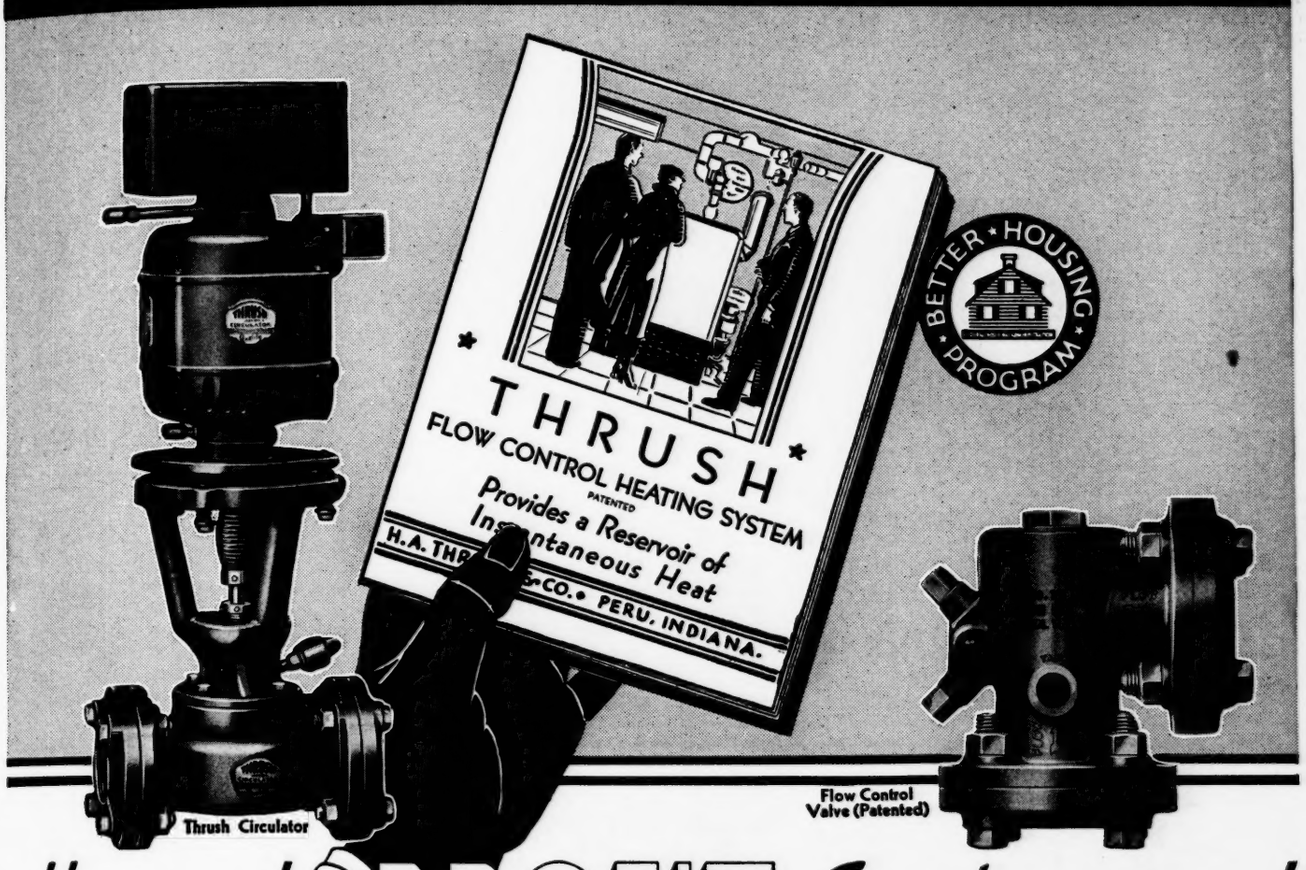

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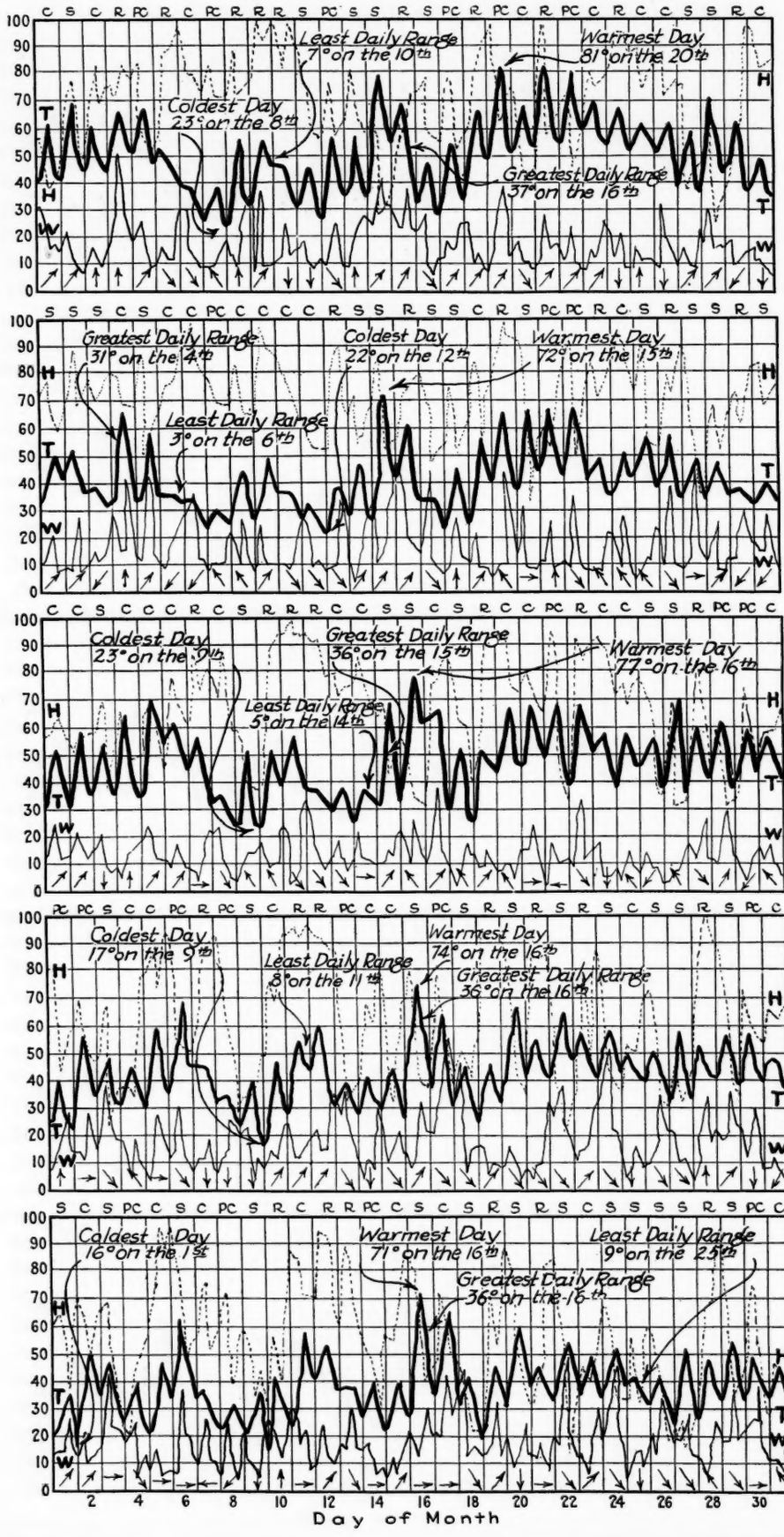
THE WEATHER FOR MARCH, 1935

Plotted from records especially compiled for HEATING AND VENTILATING by the U. S. Weather Bureau. Heavy curves (T), temperatures in deg. F.; dotted lines (H), per cent relative humidity, from readings at 8 a.m., noon, and 8 p.m., except for New York, which shows hourly readings. Light lines (W), wind velocity in m.p.h. Arrows indicate prevailing wind directions. S—clear; PC—partly cloudy; C—cloudy; R—rain, Sn—snow.


Least Daily Range 7° on the 10th
Warmest Day 81° on the 20th
Coldest Day 23° on the 8th
Greatest Daily Range 37° on the 16th
Greatest Daily Range 31° on the 4th
Coldest Day 22° on the 12th
Warmest Day 72° on the 15th
Least Daily Range 3° on the 6th
Coldest Day 23° on the 9th
Greatest Daily Range 36° on the 15th
Warmest Day 77° on the 16th
Least Daily Range 5° on the 14th
Coldest Day 17° on the 9th
Warmest Day 74° on the 16th
Least Daily Range 8° on the 11th
Greatest Daily Range 36° on the 16th
Coldest Day 16° on the 1st
Warmest Day 71° on the 16th
Least Daily Range 9° on the 25th
Greatest Daily Range 36° on the 16th
Day of Month

St. Louis

Mean temp. for month, 51.2°; aver. wind velocity, 14.6 m.p.h.; prevailing direction of wind, S.W.

Chicago

Mean temp. for month, 41.3°; aver. wind velocity, 12.0 m.p.h.; prevailing direction of wind, S.W.

Pittsburgh

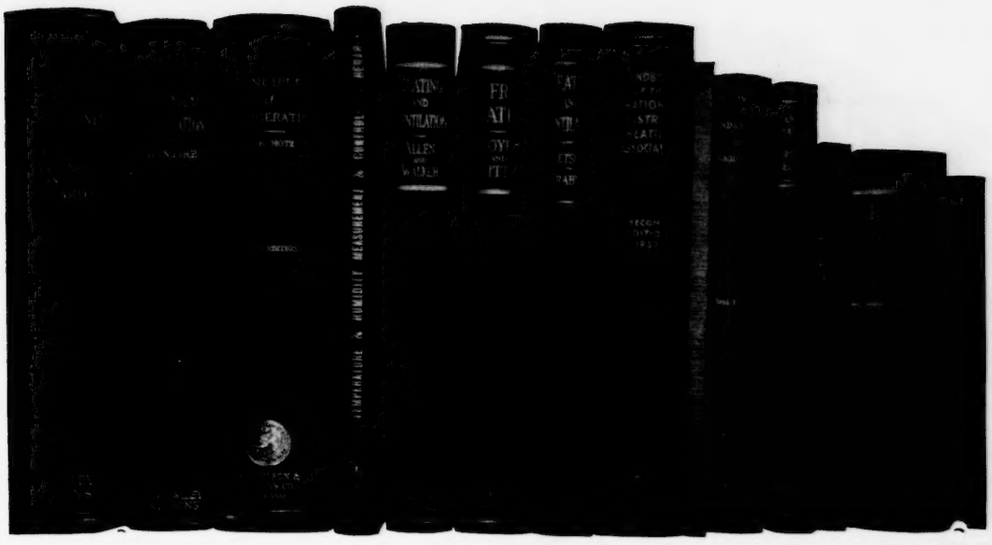
Mean temp. for month, 47.6°; aver. wind velocity, 11.1 m.p.h.; prevailing direction of wind, S.W.

New York

Mean temp. for month, 43.2°; aver. wind velocity, 15.7 m.p.h.; prevailing direction of wind, N.W.

Boston

Mean temp. for month, 38.4°; aver. wind velocity, 15.7 m.p.h.; prevailing direction of wind, W.



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"Hot Water" has been our specialty for over 40 years; we have solved hundreds of complaints, some with new heaters, some with advice on repiping, better trapping, etc., in all types of buildings: office, loft, hospital, school, club, apartment, industrial, laundries, and others. We shall be glad to be of similar service to you.

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STORAGE HEATERS

WHITLOCK HEAT TRANSFER EQUIPMENT

New Haven's "Comet" Completely Air Conditioned

(Concluded from page 28)

ature may be maintained in any of the passenger compartments.

Ducts are provided on each side of the cars for distribution of the air. The blowers deliver air to the ducts in both directions from the centrally-located air conditioning units, so that cool air is distributed into the car from both sides at the roof which gives the most ideal method of air distribution. No return ducts are necessary since the air conditioning units are located inside the car directly under the car roof.

A heating coil is provided in each air conditioning unit which serves to temper the ventilating air brought in from the outside and to heat the car in mild weather. Sufficient capacity is provided to deliver 420 B.t.u. per min. to the car with 70° entering air and 2 lb. steam pressure in the coils.

The conventional scheme of steam floor heat is used in conjunction with the overhead heat in extremely cold weather. Steam is supplied to the heating system by an oil-fired boiler. The control of these two sources of heat is coordinated and arranged for automatic operation.

Inasmuch as it was desired to have complete control of the regulation of temperature in each car individually, and due to the limited space available, it was not feasible to conduct the cool air from the end cars through flexible ducts. This fact together with the advantages of mounting the compressor units in the power compartments of the end cars makes it necessary to provide flexible connections in the refrigerant lines between cars. These connections are an adaptation of standard seamless flexible metal hose reinforced mechanically.

Equipment Sales Up Sharply Over 1934

(Concluded from page 33)

February Equipment Sales

There were 3567 oil burners sold in the United States of which 3145 were mechanical draft and 152 natural draft conversion burners. Two hundred and thirty boiler-burner units and 40 furnace-burner units were sold. The 3567 total compares with 2115 sold in February, 1934. There were $39,865 in air washers sold during the month, as compared with $8331 in the corresponding month of 1934. Similarly, there were $169,190 in industrial air conditioning units as compared with $43,722 in February, 1934. Ventilating blowers increased from $26,564 in February, 1934, to $29,181 in February of this year. The corresponding increase in direct-connected small housed and propeller fans was from $66,038 to $106,113. Unit heaters rose from $174,314 to $209,031 and unit ventilators from $43,687 to $67,521.

In the indirect heating surface group, sales of the steel type dropped from $1426 in February, 1934, to $1319 in February, 1935. The non-ferrous type showed

a decline from $76,140 to $59,210, while the cast-iron type showed a sharp increase from $1811 to $10,042.

The residential type stokers increased in number of units from 544 in February, 1934, to 1113 in February, 1935, while the small commercial rose from 57 to 107 and the large commercial type from 25 to 48.

Building Loans

Loans made by building and loan associations for the first quarter of 1935 are reported as considerably in excess of any similar period for the last three years.

Comparing the reporting states for 1934 and 1935, the United States Building and Loan League states that there was a 69% increase in volume of loans and a 77% increase in the number of families served, thus indicating that the size of the average loan has decreased slightly. The growing importance of modernization and repair loans is given as the chief reason for the smaller amounts disbursed per family.

Dehumidifying with Gas in a Printing Plant

(Concluded from page 31)

dehydration by adsorption, were carefully investigated as to first and operating costs. The gas-operated adsorption method is particularly well suited for humidity reduction, and comparison of the several methods indicated that this was the most desirable and economical to employ.

The composing room, as well as the press room, is completely air conditioned, because the wooden blocks must be seasoned for many days before being used to make cuts. The blocks must be kept in the same atmospheric condition during this period as when they are in storage or in use on the presses.

The total volume of the conditioned spaces is 134,000 cu. ft. Humidity reduction is provided by a gas silica gel dehumidifier which treats 4,000 c.f.m. of outside air. This equipment removes approximately 65% of the moisture from this air, after which the air is moderately cooled and delivered to the various spaces in the plant to be conditioned. Cooling of the dehydrated air is accomplished by direct surface coolers, using city water at a temperature of 72°. No further cooling is required, but a total of 15,000 c.f.m. of air is recirculated locally in the rooms to secure uniform ventilation. Since the thermal capacity of the building is large, the inside temperature rarely exceeds 88°, regardless of outside extremes. An absolute humidity of 72 grains per pound of dry air is provided, and this corresponds approximately to a relative humidity of 40% at a temperature of 85°.—*Abstracted from an article by B. P. Fonda, in the February 2, 1935, "Gas Age-Record."*

NEW CATALOGS

The Bryant Heater Co., Cleveland. A booklet devoted to problems of humidity and means of its control, entitled "The Trend in Summer Air Conditioning." It tells the story of summer air conditioning practice, dehumidifying and cooling by separate and independent operations, describes Bryant silica gel dehumidifying equipment, and tells

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of the extent of its application for industrial, commercial, social, and private needs. It is recommended to the prospective buyer of summer air conditioning equipment.

Buffalo Forge Co., Buffalo, N. Y. Bulletin 2967 entitled "Buffalo Cooling and Air Conditioning Units." A standard-size, 12-page catalog of the company's suspended and floor type unit coolers and central conditioning cabinets.

Combustion Engineering Co., Inc., 200 Madison Ave., New York. An eight-page standard-size catalog covering general specifications for a line of horizontal return tubular boilers built by this company. These boilers were formerly known to the trade under the names of Casey-Hedges and Walsh-Weidner. Both riveted and fusion welded construction for the shells is shown and various details of the boilers, grates breechings, etc., are included as well as general information on settings.

Dail Steel Products Co., Lansing, Mich. A 12-page, three-ring-punched, standard-size catalog on the Dailaire system of heating and air conditioning. Describes and illustrates the company's warm-air furnace type conditioner, together with sizes, ratings, and specifications for various sizes for different fuels.

Gorton Heating Corp., Cranford, N. J., has issued Bulletin No. 101 describing and illustrating the Gorton Surevent Equalizing system. Standard size, four pages.

H-B Instrument Co., 2518 North Broad St., Philadelphia. Bulletin No. 600 describing the company's line of dial and recording thermometers and humidity indicating instruments. Standard size, four pages.

The Ideal Electric & Mfg. Co., Mansfield, Ohio. A 16-page booklet describing in detail the Noel Speed-Arc welder.

Ilg Electric Ventilating Co., 2850 North Crawford Ave., Chicago, has published two bulletins. One is "Ilgair Cooling and Air Conditioning," which describes and illustrates and features testimonials relating to installations of the company's air conditioning products. It is standard size, 24 pages. The other, "Cool Your Whole House with the Ilgattic System," is similar but relates entirely to the company's system of attic ventilation. Standard size, 16 pages.

Iron Fireman Manufacturing Co., Cleveland, Ohio, has published three catalogs, two entitled "Iron Fireman for Homes" designated as Nos. A38 for anthracite burning stokers, and B38 for soft coal. A third catalog, H38 describes the company's line of stokers for commercial installations. All are standard size, printed in color.

Link-Belt Co., 2410 West 18th St., Chicago. Folder 1459, "Steam Costs Go Down when You Install Link-Belt Automatic Coal Firing." Contains data on underfeed screw type stokers in sizes up to 300 boiler hp. Folder 1458, "The Heating Plant Pays a Profit when You Install Link-Belt Automatic Coal Firing." Contains data on underfeed screw type stokers in sizes up to 300 boiler hp.

McDonnell & Miller, Wrigley Building, Chicago. A 24-page, standard-size catalog entitled "McDonnell Boiler Water Level Control." Profusely illustrated. Deals with the company's line of water level control equipment and how to install them. Contains diagrams, drawings, and engineering information.

Rathbun Co., Inc., El Paso, Texas, has published a series of bulletins on the treating of water used in various industries. The company's system embodies a survey of mechanical and chemical conditions surrounding a particular water and the bulletins describe this system. The water is treated for high- or low-pressure boilers, quick scale removal, engine circulating systems, refrigerating, or hot and cold water systems. Standard size.

Struthers Dunn, Inc., Philadelphia. A folder describing the company's line of relays, timing devices, electric counters, thermostats, electric pots and ladles, and engineering service.

Taylor Forge & Pipe Works, P. O. Box 485, Chicago, has issued a 96-page, standard-size catalog, No. 35, entitled

"Taylor Forged Steel Pipe Flanges." The first 35 pages are devoted to engineering information concerning flange design and materials, joint bolting, and a bibliography of articles on the general subject, together with numerous graphs for the use of the designer. The remainder of the catalog is devoted to a complete and well arranged catalog section of the company's line of pipe flanges. Printed on heavy paper, well indexed.

Tuttle & Bailey, Inc., New Britain, Conn. Catalog No. 40, "Air Conditioning Grilles and Registers." Includes descriptions of the full line of registers, grilles, volume control dampers, and other devices designed for use with air conditioning systems. Among the new products shown are the Flexair grilles and Ducturns. The Flexair can be adjusted at the job to provide a wide range of air deflections. Positive adjustments are made by two controlling levers concealed back of the grille margins. Ducturns is a device for use in ducts to turn high velocity air around right angle elbows. The tubular blades, of which it is composed, are shaped to turn air at right angles with a minimum friction loss, thus eliminating the necessity for long radius elbows.

Abstracts

(Concluded from page 50)

of interest to heating and ventilating men will be found in this volume. [*"The Chemical Formulary—Volume 2," published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York; cloth-bound; 6 x 9 in.; 570 pages; price $6.*]

HOUSING OFFICIALS' YEAR BOOK. In preparing its first annual publication, the National Association of Housing Officials has assembled authoritative accounts of the powers, activities, programs, difficulties, and accomplishments of the major governmental agencies directly concerned with the provision of low-cost housing. Consequently, it includes chapters on PWA, FHA, the Home Loan Bank Board, subsistence homesteads, rural housing rehabilitation, TVA low-cost housing, and a discussion of European housing. In the back is a selected bibliography on housing. [*"Housing Officials' Yearbook, 1935," published by the National Association of Housing Officials, 850 East 58th St., Chicago; price $1.*]

A SMALL CONSTANT HUMIDITY CHAMBER. Describes the construction and operation of a small chamber capable of maintaining constant temperature and humidity within limits required for tests on textile materials. Chamber is 8 ft. high and 5 ft. square. Dehumidification is accomplished by passing a stream of air through a bed of calcium chloride lumps. The air is moistened by passing it through a bed of pumice which is kept wet by a series of fine water sprays. A hair hygrometer is used to control the moisture content. It is possible to maintain any humidity between 45 and 98% in the room. [*"Note On a Small Constant Humidity Chamber," by T. Lonsdale. Engineering (London), March 22, 1935, page 321; approximately 1000 words; illustrations.*]

FUEL OIL STANDARDS. Specifications covering six grades of fuel oil for various types of fuel burning equipment which have been accepted as the standard by the oil heating industry. It is the third edition of the commercial standard for fuel oils and became effective for new production on February 15, 1935.

[*"Commercial Standard CS12-35 for Fuel Oils," published by the National Bureau of Standards, U. S. Department of Commerce. For sale by the Superintendent of Documents, Washington, D. C.; price 5c.*]

HOUSING PROGRAM FOR THE UNITED STATES. A pamphlet presenting the main outlines of a low-cost housing program for the United States. It is the result of a countrywide study made by a group of Americans and Europeans of housing conditions. [*"A Housing Program for the United States." Published by the National Association of Housing Officials, 850 East 58th St., Chicago; paper-bound; 6 x 9 in.; 22 pages.*]

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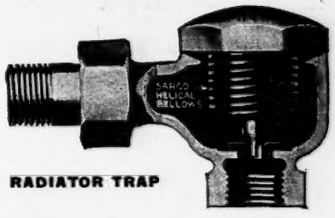

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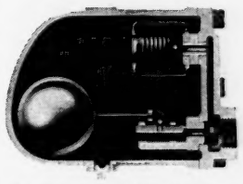

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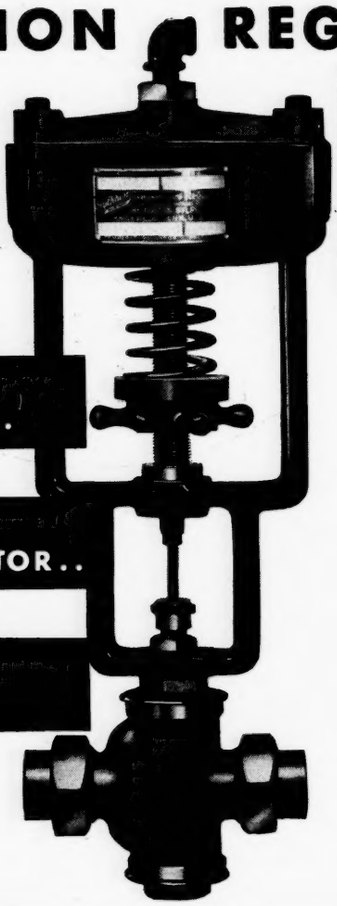

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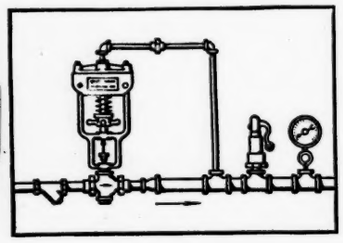

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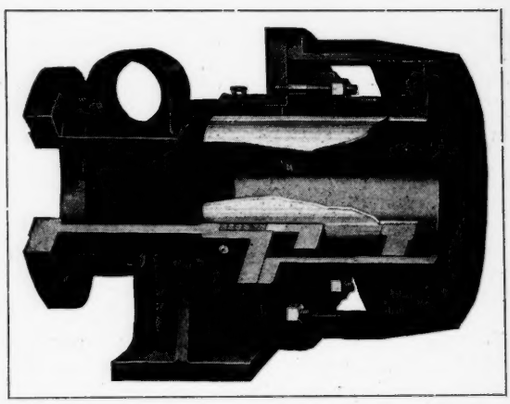

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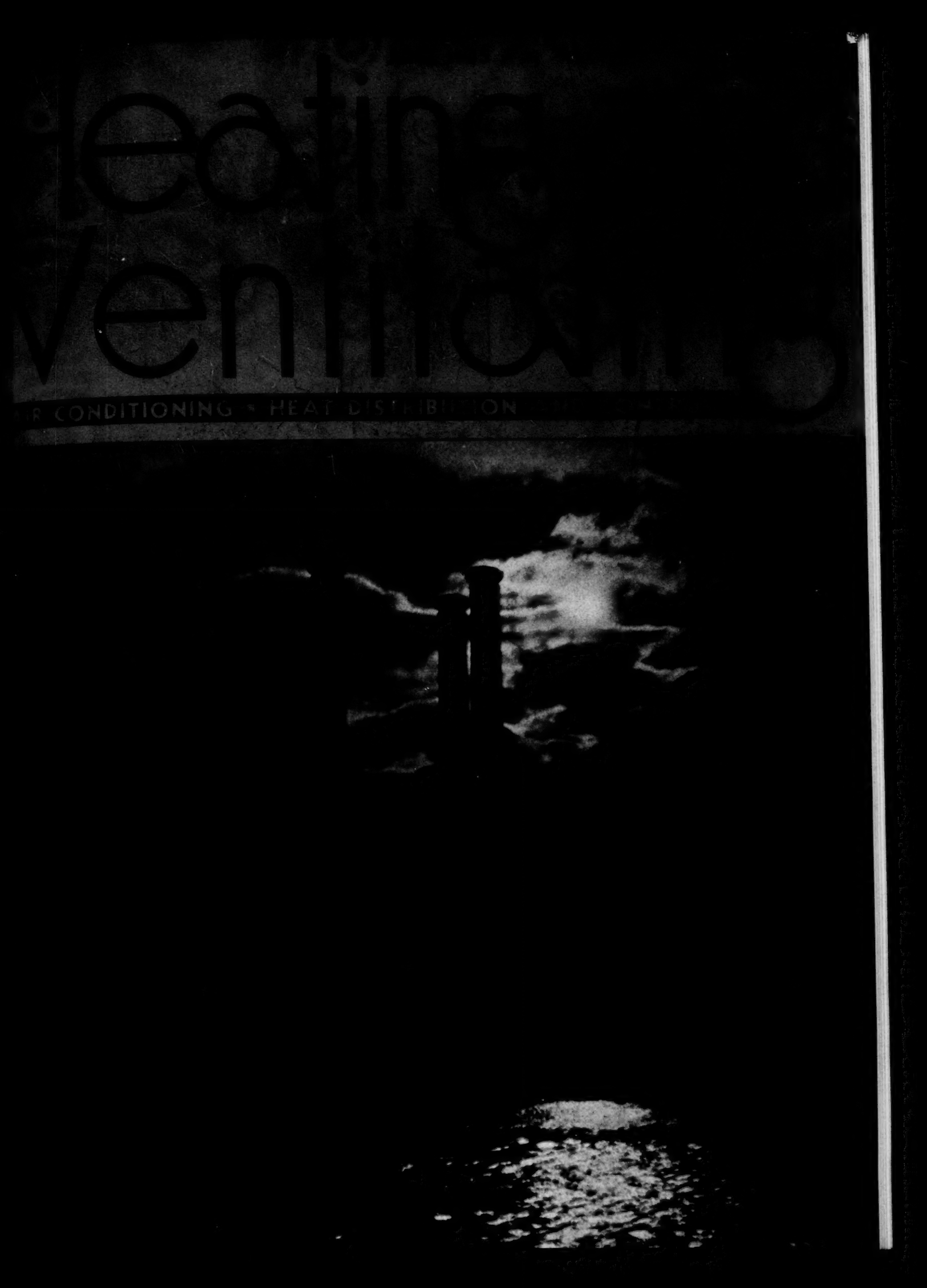
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